E-1F9910

POST-FIRE SAFE SHUTDOWN AREA ANALYSIS

ENGINEERING REVIEW:
DRAFTER:
CHECKER:
ENGINEER:
SUPERVISOR:

☒ ELECTRONIC APPROVAL

1. ☐ APPROVED-MFG. MAY PROCEED
2. ☐ NOT APPROVED--RESUBMIT FINAL DOCUMENT/DRAWING-MFG. MAY PROCEED ☐ YES ☐ NO
3. ☐ APPROVED INFORMATION NOT CONTROLLED UNDER DESIGN PROCESS
4. ☐ ACCEPTABLE-MAINTAIN AS RECORD (INFO. ONLY)
5. ☐ RESTRICTED FOR WOLF CREEK PLANNING ONLY-MFG. MAY PROCEED ☐ YES ☐ NO

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COMMENTS: **ALSO CONTAINS ADMINISTRATIVE CORRECTIONS PER AP 05-010 PARAGRAPH 6.10.**

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1.0 PURPOSE

The purpose of this report is to document an area-by-area analysis of the Post-Fire Safe Shutdown (PFSSD) capability at Wolf Creek Nuclear Operating Corporation (WCNOC), Unit 1. This report provides objective evidence that Wolf Creek complies with applicable provisions in 10CFR50.48(a) and Wolf Creek commitments to 10CFR50, Appendix R, Section III.G, as they relate to protection of one train (or success path) of systems necessary to achieve and maintain safe shutdown.

The PFSSD analysis is part of the "Approved Fire Protection Program" at Wolf Creek. In accordance with operating license condition 2.C.(5)(b), changes to the approved fire protection program are allowed as long as the change does not impact the ability to achieve and maintain PFSSD. Technical changes to this document require review per AI 26A-003 and PSRC approval prior to implementing.

2.0 SCOPE

This document includes a detailed review of the PFSSD capability in all fire areas at Wolf Creek. Fire areas within the powerblock structures are listed in the fire hazards analysis and fire delineation drawings (A-1801 through A-1812).

The detailed review was performed in accordance with the methodology in Section 4.0. This includes reviewing each selected area using the new component list, cable list and logic diagrams contained in Calculation XX-E-013; E-15000 (SETROUTE); and, drawings E-1F9001 through E-1F9444.

3.0 BACKGROUND

On March 22, 1975 a fire occurred at the Browns Ferry Nuclear Power Plant that damaged over 1600 electrical cables and caused the temporary unavailability of some core cooling systems. Prior to the Browns Ferry fire, fire protection requirements were limited to the broad and generalized criteria contained in 10CFR50, Appendix A, General Design Criteria 3, *Fire Protection* as well as the Insurance guidelines of ANI. The fire at Browns Ferry caused the NRC to review the fire protection programs and requirements at all operating nuclear power plants. A special review group was formed to investigate the fire and provide recommendations for improving the fire protection programs at operating plants.

The special review group developed over 50 recommendations to improve the fire prevention and control at existing power plants. Based on these recommendations, the NRC developed guidelines that were issued by the NRC in Branch Technical Position Auxiliary and Power Conversion Systems Branch (BTP APCSB) 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants." These guidelines only applied to new plants that were not currently docketed. Guidelines for existing plants were contained in Appendix A to BTP APCSB 9.5-1.

In May, 1976 the NRC requested licensees review their fire protection program against the guidelines in BTP APCSB 9.5-1. In September, 1976 the licensees were also requested to prepare a fire hazard analysis that divided the plant into distinct fire areas and show that redundant systems required to achieve and maintain cold shutdown are adequately protected against damage by a fire. The licensees responded with a fire protection program evaluation and a fire hazard analysis that, in some cases, identified aspects of licensees' fire protection programs that did not conform to the NRC guidelines.

After a number of meetings and discussions with licensees to resolve differences, several unresolved issues remained. The NRC and licensees attempted to resolve the differences but, despite these efforts, could not come to common ground on some key recommendations. Since the recommendations in BTP APCSB 9.5-1 did not have the force of law, the NRC could do nothing to require the licensees to comply. Consequently, the NRC issued a proposed "Fire Protection Rule" (10CFR50.48) and Appendix R to 10CFR50, which was later adopted into law.

The fire protection rule (10CFR50.48) made it clear that Appendix R only applies to plants licensed to operate prior to January 1, 1979. Therefore, Wolf Creek is not an Appendix R plant by law. However, 10 CFR 50.48(e) states that plants licensed to operate after January 1, 1979 are required to complete all fire protection modifications needed to satisfy Criterion 3 of Appendix A to 10CFR50 in accordance with the provisions of their operating license. The Wolf Creek SER, dated April 1982, Section 9.5.1.7 states, in part:

> *Although this rule and its Appendix R are not directly applicable to Wolf Creek, the requirements set forth in Appendix R are being used as guidelines in licensing plants after January 1, 1979. ... The Staff will condition the operating license to require the applicant to meet the technical requirements of Appendix R to 10CFR50, or provide equivalent protection.*

Wolf Creek responded to this request by performing a comparison of the requirements in Appendix R with the Wolf Creek design. This comparison is contained in the Wolf Creek USAR, Appendix 9.5E. The Wolf Creek responses to the Appendix R requirements are considered license commitments.

Section III.G of Appendix R specifies the requirements for fire protection of safe shutdown capability. Wolf Creek's response to the requirements of Appendix R, Section III.G is as follows:

> *USAR Appendix 9.5B provides an area-by-area analysis of the power block that demonstrates that no single fire can prevent safe shutdown.*
>
> *Redundant trains of systems required to achieve and maintain hot standby are separated by 3-hour rated fire barriers, or the equivalent provided by III.G.2, or else a diverse means of providing the safe shutdown capability exists and is unaffected by the fire.*
>
> *For redundant trains of systems required to achieve and maintain cold shutdown that could potentially be affected by a single fire, repairs or local operator actions can be performed within 72 hours.*
>
> *As described in Appendix 9.5B and Section 7.4, an auxiliary shutdown panel is provided as a dedicated means of achieving and maintaining hot standby in the event that the control room is uninhabitable due to a fire.*
>
> *The ESW pumphouse also complies.*

The EFHA was the original evaluation that reviewed the capability to achieve and maintain safe shutdown after a fire. Following completion of the EFHA, a summary of the safe shutdown capability following a fire in each plant area was documented in the Wolf Creek USAR, Appendix 9.5B. In addition, a list of the minimum components needed to achieve and maintain safe shutdown following a fire was included in Table 9.5B-2 of the USAR. Wolf Creek document E-15000, Electrical Cable and Raceway List, identified cables and components necessary for post-fire safe shutdown with an (S.) designation in the appropriate field.

The EFHA was not a controlled document and did not have a Wolf Creek document number. Since the pertinent information from the EFHA was placed in the USAR and E-15000, control of the post-fire equipment and cable list fell under the design change and USAR change process.

During the 2005 NRC triennial fire protection inspection, the NRC team identified a non-cited violation for failure to maintain one train of equipment free of fire damage. The basis for this finding was that Wolf Creek credited manual actions in fire areas where physical separation and/or protection of redundant PFSSD equipment were not provided. Wolf Creek challenged the violation on the basis that the Wolf Creek operating license allows the use of 'diverse means' to achieve and maintain PFSSD where physical separation and/or protection are not provided. This is documented in the Wolf Creek USAR, Table 9.5E-1. The NRC replied by stating that the use

of manual actions outside the control room is not sufficient to demonstrate a diverse means of providing safe shutdown capability. In addition, the NRC argued that use of manual actions is an adverse change to the fire protection program due to the introduction of human error vulnerabilities. The NRC accepted the use of feasible manual actions as compensatory measures and re-classified the non-cited violation as an apparent violation with enforcement discretion. The crediting of manual actions as 'diverse means' is no longer applicable to Wolf Creek.

4.0 METHODOLOGY

The PFSSD capability in a given area is determined by evaluating all PFSSD related cables and components in the area and determining if redundant capability exists outside of the area and is unaffected by a fire. The minimum set of systems and components required for PFSSD are listed in Calculation XX-E-013. These systems and components are required to ensure hot standby and cold shutdown reactivity conditions can be achieved following a fire. System/component interactions, as well as component redundancy, is shown on the PFSSD logic diagrams (E-1F9001 through E-1F9444). The Wolf Creek electrical cable and raceway list (E-15000) identifies all required PFSSD components and cables, as well as associated circuits of concern.

The methodology for completing each fire area analysis is described in this section. Figure 4.1 is a flow chart showing the area analysis methodology.

The reactor building is divided into 11 distinct fire areas in other WCNOC documents such as the fire hazards analysis, the combustible loading calculation and the fire delineation drawings. However, for this report, the reactor building is combined into one analysis due to the physical characteristics of the building.

In some areas, conduit carrying PFSSD cables is embedded in the concrete walls and floors. If the concrete embedment meets minimum depth requirements, then fire damage to the cable does not have to be considered in the fire area assessment. If the embedment does not meet minimum requirements, then the PFSSD analysis needs to consider that the cable is located in the fire area that it passes. Attachment 2 provides an evaluation of the embedded raceway at Wolf Creek.

Instrumentation is credited to provide operators with diagnostic indication of system parameters. Instrument sensing lines are vulnerable to the effects of fires because the heat from a fire could affect the sensitivity of the instrument and provide false readings and/or cause spurious actuation of equipment. Attachment 3 provides an analysis of the effects of fire on PFSSD credited instrument sensing lines.

The methodology used to complete each area analysis is as follows:

1. Determine all PFSSD related cables and equipment located in the area of concern.

2. Determine worse-case PFSSD equipment failures that could occur due to a fire in the area of concern. The worse-case failures shall include multiple spurious operations (MSOs) that may occur due to the presence of cables and/or equipment in the fire area under consideration. The methodology for performing a MSO review is described in Section 4.2. The results of the MSO review are documented in Attachment 4.

3. Determine if redundant PFSSD capability exists outside the fire area of concern or if separation of redundant PFSSD components and circuits meets the requirements of 10CFR50, Appendix R, Section III.G.2.

4. Perform circuit analysis on the affected cable(s), if necessary, to determine the combinations of hot shorts, open circuits and/or shorts to ground necessary to cause the equipment to change to an undesired state and whether circuit failures could cause a spurious actuation. Circuit analysis should consider hot shorts through the ground plane, commonly known as ground fault equivalent hot shorts (GFEHS).

5. Determine if feasible and reliable manual actions exist using the guidance in NUREG-1852.

6. Document the analysis in a report.

Discussion of each methodology step is provided below.

4.1 DETERMINE ALL PFSSD RELATED CABLES AND EQUIPMENT

Equipment required to remain functional to safely shut down the plant and maintain it in a safe shutdown condition following a fire is listed in Calculation XX-E-013. The components listed in XX-E-013, as well as associated PFSSD cables, are designated as (S.) in the Wolf Creek electrical cable and raceway list (E-15000). "Associated circuits" are also designated as (S.). Using the computer database program SETROUTE (E-15000), generate a report of all S. cables and equipment in the area. The data on this report comprises the master list of cables and equipment to be analyzed in the area analysis. Only (S.) cables and equipment are evaluated in this report.

Tabulate the list of (S.) equipment in the area, along with a description of the equipment, its location (room number), and a reference to the evaluation section containing a detailed discussion about the component. Provide comments regarding the component, as necessary.

Tabulate the list of (S.) cables in the area, along with the cables location, primary PFSSD equipment associated with the cable, the cables function (Power, Control or Instrumentation), a reference to the report section containing a detailed discussion of the cable and comments.

4.2 DETERMINE WORSE-CASE PFSSD EQUIPMENT FAILURES THAT COULD OCCUR

All unprotected PFSSD cables and equipment in the area of concern are assumed to be damaged by the fire, regardless of fire loading and presence of automatic fire suppression. If a 20 foot combustible and fire hazard free zone exists within the area, as well as automatic suppression and detection per Wolf Creek's commitments to 10CFR50, Appendix R Section III.G.2.b, the fire is assumed to only affect cables and equipment on one side of the combustible and fire hazard free zone (Note: Evaluation of insitu combustibles within the 20 foot combustible and fire hazard free zone is documented in E-1F9905). Cables that are protected in accordance with Appendix R, Section III.G.2.a (3-hour fire barrier) or III.G.2.c (1-hour fire barrier with suppression and detection in the area) are assumed to be unaffected by a fire. Equipment associated with unprotected PFSSD cables running through the fire affected area of concern is assumed to move to its undesired position (i.e. valves fail closed when PFSSD requires them to be open). Detailed circuit analysis to determine the legitimate failures that can occur was not performed during this step.

Damage to cables associated with instruments (e.g., resistance temperature detectors, thermocouples, pressure transmitters, and flow transmitters) causes the instrument to fail upscale, midscale, or downscale, whichever is worse. An instrument performing a control function is assumed to provide an undesired signal to the control circuit.

Based on the assumption that equipment fails in its undesired state, perform an evaluation to determine if redundant capability exists, as described in Section 4.3 below. If redundant capability exists and is unaffected by the fire, no additional analysis, including circuit analysis, is required and the evaluation is documented in the appropriate section.

4.2.1 IDENTIFICATION AND TREATMENT OF MULTIPLE SPURIOUS OPERATIONS (MSOS)

Enforcement Guidance Memorandum (EGM) 09-002 was issued on May 14, 2009. This EGM describes the conditions limiting enforcement discretion during the resolution of fire protection concerns involving multiple spurious operations (MSOs). Based on the EGM, enforcement discretion is limited to three years from the date of issuance of Regulatory Guide (RG) 1.189, Revision 2 as follows: (1) six months following the issuance of RG 1.189, Rev. 2, licensees to identify non-compliances related to multiple fire induced circuit faults, place the non-compliances into their corrective action program and implement compensatory measures, and (2) three years following the issuance of RG 1.189, Rev. 2 for licensees to complete the corrective actions associated with noncompliant fire induced circuit faults. RG 1.189, Rev. 2 was issued on November 2, 2009.

The methodology to perform a MSO review is described in Nuclear Energy Institute (NEI) document 00-01, Chapter 4. This approach was accepted by the NRC in RG 1.189, Section 5.3.1.1. The basic steps in performing this review are described below. For a more detailed discussion, refer to NEI 00-01.

4.2.1.1 Industry Develop a Generic List of MSOs

Appendix G of NEI 00-01 provides a generic list of MSOs developed from an industry survey of all US nuclear power plants. The survey results were compiled into a table, and draft lists were developed for each reactor type (BWR and PWR). Comments on the draft lists were received from the industry and the final lists were published in NEI 00-01, Rev. 2 Appendix G.

4.2.1.2 Plant Specific Expert Panel Review of Generic MSO List

A plant specific expert panel review was performed to review the generic MSO list, determine applicability of each MSO scenario at the facility and to develop plant-specific scenarios that are not listed in the generic list. An expert panel was convened at Wolf Creek on February 17 and 18, 2009. The expert panel was made up of representatives from Operations, Fire Protection, Design Engineering, Systems Engineering and PRA groups.

The MSO expert panel meeting was led by Westinghouse PRA personnel as part of the Fire PRA development. Although the expert panel was conducted specifically for the Fire PRA, the conduct and scope of the meeting generally followed the methodology in a draft version of NEI 00-01, Rev. 2, since the final version was not released until after the Wolf Creek MSO expert panel meeting. There were no significant differences between the methodology and generic MSO list in the draft version of NEI 00-01, Rev. 2 and the final version.

As a result of the expert panel meeting, 13 plant specific scenarios were added and five of the 59 generic MSOs were screened out. Attachment 4 shows the Wolf Creek list of MSOs.

4.2.1.3 Review of Plant Specific MSO List for Impact on PFSSD

The Wolf Creek MSO list was reviewed to determine if any of the scenarios have the potential to adversely impact the ability to safely shutdown following a fire. The Wolf Creek PFSSD analysis (E-1F9910) was used to determine which fire areas, if any, the MSO scenario can occur in. This was determined by reviewing cable routing associated with each component identified in the scenario. If cables associated with the components identified in the scenario are located in the fire area, then the fire area is identified as applicable to the scenario.

After all MSO scenarios are reviewed, and applicable fire areas listed, the list is reviewed again to determine if PFSSD is potentially affected. The following was considered in determining potential PFSSD impact:

1. Are actions available in the main control room to mitigate the MSO.
2. Will cable damage actually cause the spurious actuation.

3. Does the thermal hydraulic analysis (WCNOC-CP-002) support a conclusion that the MSO will not adversely impact PFSSD.
4. Is redundant capability available to mitigate the effects of the MSO.
5. Is an approved feasible and reliable operator manual action available to mitigate the MSO.
6. Is a calculation available that supports a conclusion that the MSO will not adversely impact PFSSD.

If at least one of the conditions above is satisfied, then the results are documented in the fire area analysis for the area(s) under consideration. If none of the above conditions are satisfied, then a potential PFSSD concern is identified and placed in the corrective action program. The corrective action program then determines the corrective measures that are needed to resolve the MSO concern. Attachment 4 shows the results of the MSO evaluation.

4.3 DETERMINE IF REDUNDANT PFSSD CAPABILITY EXISTS OUTSIDE THE FIRE AREA OF CONCERN

The PFSSD Logic Diagrams (E-1F9001 through E-1F9444) show the combinations of equipment and redundancy necessary to achieve safe shutdown after a fire. Using the logic diagrams, redundant PFSSD capability in the area of concern was determined.

The list of equipment that is unavailable due to a fire in the area was compared against the logic diagrams to determine if redundant equipment remains available to achieve the PFSSD functions. If redundant equipment remains available and is unaffected by a fire in the area of concern such that all PFSSD functions can be achieved, then the PFSSD goals are satisfied for a fire in the area. The analysis is documented and PFSSD is assured. If redundant equipment is not available, then further analysis is necessary as described in the next section.

4.4 PERFORM CIRCUIT ANALYSIS

Where redundant PFSSD capability does not exist or is affected by the fire, a circuit analysis on the affected cable(s) is performed to determine if a single failure or combination of failures will result in the component moving to an undesired position. If the circuit analysis determines that no possible combinations of failures could occur that will result in the component moving to an undesired position, then the analysis is documented and PFSSD is assured. If the circuit analysis determines that the redundant component could spuriously operate to the undesired state, then an evaluation of manual actions is performed as described in the next section.

With few exceptions, the circuit analysis was performed using a conservative “any-and-all” approach. This approach assumes that any number of cable failures could occur at the same time to cause the component to fail in an undesired state, and is intended to bound any current and foreseeable regulatory positions on the matter of cable failures. The cable failures have to be credible, in that inter-cable hot shorts cannot occur between cables routed in different raceways, except in the case of ground fault equivalent hot shorts (GFEHS) discussed below. Also, for three-phase AC circuits, the probability of having a hot short in the proper sequence to cause spurious operation of a motor is implausible and does not require evaluation, except in cases involving high/low pressure interfaces.

The circuit analysis assumes that inter-cable (cable-to-cable) hot shorts involving thermoset cables can occur, even though current NRC guidance indicates that this failure mode is substantially less likely than other cable failure modes (RIS 2004-003, Rev 1). The circuit analysis also considers that, for DC control circuits, intra-cable (conductor-to-conductor) failures of the proper polarity are possible and that inter-cable failures of the proper polarity are possible, even between thermoset cables, if the cables are run in the same raceway. Finally, the analysis assumes that cable failure and subsequent equipment mal-operation occurs indefinitely and will not self-mitigate after a specified time period, even though RIS 2004-003, Rev. 1 states that

recent testing strongly suggests fire-induced hot shorts tend to self-mitigate (e.g. short to ground) in less than 20 minutes.

Ground fault equivalent hot shorts (GFEHS) were experienced during fire testing of DC circuits and reported in NUREG/CR-7100, Direct Current Electrical Shorting in Response to Exposure Fire (DESIREE-Fire) dated April, 2012. The test results were analyzed in draft NUREG-2128, Electrical Cable Test Results and Analysis during Fire Exposure (ELECTRA-FIRE). A GFEHS is a hot short from an energized source conductor in one cable that contacts the ground plane and energizes a target conductor in a different cable that has also come into contact with the ground plane. In this scenario, the ground plane becomes the conducting path from source to target conductors. A GFEHS only needs to be considered on ungrounded AC or DC circuits. This is because a short to ground on a grounded circuit would clear the circuit protective device and de-energize the circuit. At Wolf Creek, AC circuits credited for PFSSD are grounded. Therefore, the GFEHS scenario only applies to ungrounded DC circuits at Wolf Creek. Furthermore, the power source needs to be compatible. For example, an AC hot short on a DC circuit is not compatible. Also, the DC hot short source must be from the same power supply as the ungrounded polarity to ensure a complete flow path, otherwise no current will flow in the circuit. Another factor to consider is the relative location of the source and target cables. Fire testing reported in the test reports above showed GFEHS where the source and target cables were located in different raceway located adjacent to one another. No deterministic conclusion can be made where the raceways containing these cables are located a distance from one another. Therefore, it should be assumed that GFEHS can occur between cables located anywhere within the fire area under consideration.

Exceptions to the above approach are discussed in the individual area analyses on a case-by-case basis.

4.5 IDENTIFY MANUAL ACTIONS

If redundant PFSSD capability does not exist and circuit analysis shows that spurious actuation can occur such that PFSSD is not assured, determine if feasible and reliable manual actions are available to safely shut down the plant using the guidance in NUREG-1852. If feasible and reliable manual actions are available, document the feasibility and reliability analysis in E-1F9900 and submit a license amendment request to the NRC as applicable and initiate any additional compensatory measures as necessary until the license amendment is granted. If feasible and reliable manual actions are not available, initiate appropriate compensatory measures and document the condition in a condition report.

4.6 DOCUMENT THE ANALYSIS IN A REPORT

The area analysis is documented in a report that is divided into the following sections:

1. *General area description* - This section describes the rooms located in the area, a general description of the fire protection features provided, and a discussion of the 10CFR50, Appendix R, Section III.G.2 separation criteria used.

2. *Primary equipment used for PFSSD* - This section contains a table that identifies each required PFSSD system and a discussion of the availability of the system to perform its PFSSD functions. Additional summary is contained in Section 8.0 of this Fire Area Analysis Narrative section.

3. *Actions to achieve and maintain PFSSD* - This section describes those actions that are necessary to ensure Wolf Creek can achieve and maintain safe shutdown conditions following a fire in the area of concern. Actions required outside the control room are considered compensatory measures subject to enforcement discretion until permanent corrective actions are taken to resolve the condition. Actions required inside the control room are documented because of the potential failure of a redundant control room component. These actions are acceptable per the Wolf Creek licensing basis. Actions to

achieve and maintain cold shutdown are documented to identify potential repairs. Cold shutdown repairs are acceptable per the Wolf Creek licensing basis.

4. *Conclusion* - This section provides an overall summary of the PFSSD capability for a fire in the area of concern.

5. *Detailed analysis* - This section describes the detailed component and cable analysis for all PFSSD components and cables in the area. The first sub-section evaluates PFSSD equipment and associated cables that are physically located in the area of concern. The second sub-section evaluates all PFSSD cables run through the area.

5.0 ASSUMPTIONS

1. Inter-cable (cable-to-cable) hot shorts involving thermoset cables can occur.

2. For DC control circuits, intra-cable (conductor-to-conductor) failures of the proper polarity are possible and inter-cable failures of the proper polarity are possible if the cables are run in the same raceway.

3. Cable failure and subsequent equipment mal-operation occurs immediately, simultaneously, and last indefinitely and will not self-mitigate after a specified time period.

4. Whenever both RCP seal injection and thermal barrier cooling are lost, the RCPs are assumed to be tripped and a natural circulation cool down performed. When only one of the two seal cooling methods is lost, RCP operation will continue and the lost method will be re-established when available, per Wolf Creek procedures.

For a list of additional assumptions, see Calculation XX-E-013.

6.0 DEFINITIONS

Inter-Cable Hot Short - A term used to describe a cable failure whereby a short occurs between conductors within different cables.

Intra-Cable Hot Short - A term used to describe a cable failure whereby a short occurs within a multi-conductor cable.

7.0 REFERENCES

1. Facility Operating License Number NPF-42 for Wolf Creek Nuclear Operating Corporation Unit 1

2. 10CFR50, Appendix A, General Design Criteria 3 - Fire Protection

3. 10CFR50.48, Fire Protection

4. 10CFR50, Appendix R - Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979.

5. NUREG-0881 (including Supplements 3 and 5), Safety Evaluation Report related to the operation of Wolf Creek Generating Station, Unit 1.

6. Wolf Creek Updated Safety Analysis Report

7. NRC Generic Letter 86-10, Implementation of Fire Protection Requirements.

8. Wolf Creek Letter No. WM 06-0013 dated April 14, 2006 - Response to NRC Non-cited Violation 2005008-03 regarding operator manual actions.

9. NRC Letter EA-06-170 dated July 25, 2006 - Response to Wolf Creek letter WM 06-0013 regarding operator manual actions.

10. NUREG-1852 dated October, 2007 - Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to a Fire.

11. Enforcement Guidance Memorandum (EGM) 09-002 – Enforcement Discretion for Fire Induced Circuit Faults, dated May 14, 2009.

12. NRC Regulatory Guide (RG) 1.189, Revision 2 – Fire Protection for Nuclear Power Plants.

13. Nuclear Energy Institute (NEI) document 00-01, Rev. 2 – Guidance for Post-Fire Safe Shutdown Circuit Analysis, May 2009.

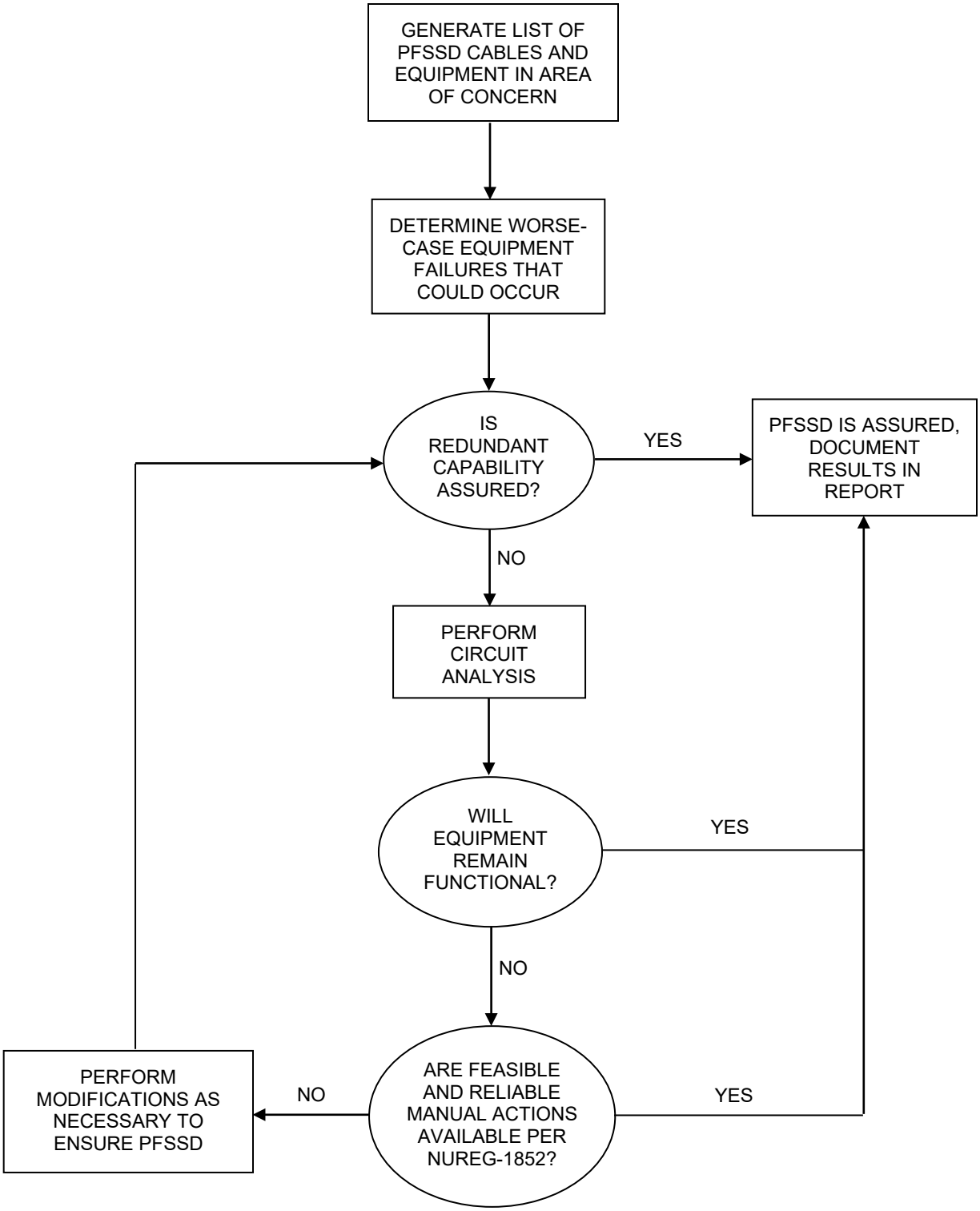
14. Calculation WCNOC-CP-002, Rev. 1 – Fire Protection Transient Analysis with RETRAN-3D.

15. NUREG/CR-7100, Direct Current Electrical Shorting in Response to Exposure Fire (DESIREE-Fire) dated April, 2012.

16. NUREG-2128, Electrical Cable Test Results and Analysis during Fire Exposure (ELECTRA-FIRE).

For additional references, see Calculation XX-E-013.

Figure 4.1, PFSSD Area Analysis Flow Chart



8.0 SUMMARY OF AREA ANALYSES

This section provides a summary of the detailed analyses for each fire area. Each summary contains the following information:

- A description of the physical characteristics of the fire area including the presence or absence of 20 foot combustible and fire hazard free zones and fire protection features provided.
- The 'Train' of equipment primarily credited for post-fire safe shutdown (PFSSD).
- A summary of the reactivity control success path availability to achieve and maintain PFSSD.
- A summary of the reactor coolant makeup success path availability to achieve and maintain PFSSD.
- A summary of the decay heat removal success path availability to achieve and maintain PFSSD.

8.1 FIRE AREA A-1 (GENERAL AREAS 1974 AND 1988 ELEVATIONS)

There are no 20 foot combustible and fire hazard free zones in fire area A-1. Fire area A-1 is protected by automatic fire detection throughout the 1974'-0" elevation. There is no fire detection installed on the 1988'-0" elevation. An automatic pre-action sprinkler system is installed above cable tray concentrations. Some of the PFSSD circuits that run through area A-1 are wrapped with 1-hour fire rated material to protect the PFSSD function of the associated equipment. This configuration meets Wolf Creek's commitments to the requirements of 10CFR50, Appendix R, Section III.G.2.c.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using the Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling all four steam generator ARVs from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using the Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. A fire in this area could cause a loss of inventory through the letdown flow path until the letdown isolation valves can be failed closed. Both pressurizer spray valves could open until operator action is taken in the control room to close the valves. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control reactor coolant system (RCS) temperature during hot standby. Both motor driven auxiliary feed water pumps (MDAFPs) could be affected. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown, however RHR pump suction may have to be lined up locally.

A fire in this area will not prevent safe shutdown of the plant.

8.2 FIRE AREA A-2 (TRAIN A SAFETY RELATED PUMPS)

There are no 20 foot combustible and fire hazard free zones in fire area A-2. Fire area A-2 has automatic fire detection installed.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling all four steam generator ARVs from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and D. Steam generators A and D ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown, however RHR pump suction may have to be lined up locally.

A fire in this area will not prevent safe shutdown of the plant.

8.3 FIRE AREA A-3 (BORIC ACID TANK ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area A-3. Fire area A-3 has automatic fire detection installed.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling all four steam generator ARVs from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using either the Train A or Train B motor driven auxiliary feed water pumps (MDAFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS

temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.4 FIRE AREA A-4 (TRAIN B SAFETY RELATED PUMPS)

There are no 20 foot combustible and fire hazard free zones in fire area A-4. Fire area A-4 has automatic fire detection installed.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling all four steam generator ARVs from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown, however RHR pump suction may have to be lined up locally.

A fire in this area will not prevent safe shutdown of the plant.

8.5 FIRE AREA A-5 (SOUTH STAIRWAY)

There are no 20 foot combustible and fire hazard free zones in fire area A-5. Fire area A-5 has automatic fire detection installed at the top of the stairway.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling all four steam generator ARVs from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.6 FIRE AREA A-6 (NORTH STAIRWAY)

There are no 20 foot combustible and fire hazard free zones in fire area A-6. There is no fire suppression installed in area A-6. An automatic fire detector is installed at the top of the stairway.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling steam generator A, B and C ARVs from the control room and locally isolating steam generator D ARV. Steam generator blowdown is isolated by closing all four blowdown valves from radwaste control room panel BM157. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through all four steam generator blowdown lines and one steam generator atmospheric relief valve until operator action is taken to isolate these flow paths. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators B and C. Steam generators B and C ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Both trains of residual heat removal (RHR) are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.7 FIRE AREA A-7 (BORON INJECTION TANK ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area A-7. Fire area A-7 has automatic fire detection installed but no suppression.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling all four steam generator ARVs from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals. If necessary, the boron injection tank (BIT) flow path will need to be manually aligned for transition from hot standby to cold shutdown. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.8 FIRE AREA A-8 (GENERAL AREA 2000 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area A-8. Fire area A-8 is protected by automatic fire detection throughout areas containing more than negligible quantities of combustibles and an automatic pre-action sprinkler system above cable tray concentrations. Some of the PFSSD circuits that run through area A-8 are wrapped with 1-hour fire rated material to protect the PFSSD function of the associated equipment. This configuration meets Wolf Creek's commitments to the requirements of 10CFR50, Appendix R, Section III.G.2.c.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage

tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals. The VCT can be isolated using both hand switches in the control room to ensure closure of at least one valve (See License Amendment 205). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling steam generator B and D ARVs from the control room and locally isolating steam generators A and C ARVs. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using the Train B CCP taking suction from the RWST and injecting water through the RCP seals. If necessary, the boron injection tank (BIT) flow path will need to be manually aligned for transition from hot standby to cold shutdown. The VCT can be isolated using both hand switches in the control room to ensure closure of at least one valve (See License Amendment 205). Pressurizer level reduction could occur due to uncontrolled cool down through two steam generator atmospheric relief valves until operator action is taken to isolate these flow paths. A fire in this area could prevent isolation of letdown from the control room. However, letdown will automatically isolate when pressurizer level reaches 17%. Both pressurizer spray valves could open until operator action is taken in the control room to close the valves. One pressurizer PORV may spuriously open and its associated block valve may not close. If this occurs, operators can close the PORV using the hand switch in the control room. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator D. Steam generator D ARV is available to control RCS temperature during hot standby. Steam generator A ARV control could be lost. Per Calculation WCNOC-CP-002, hot standby can be maintained using a single steam generator ARV. A spuriously opened ARV will not adversely impact safe shutdown. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) is available for transition from hot standby to cold shutdown, however the Train B RHR pump suction may have to be lined up locally.

A fire in this area will not prevent safe shutdown of the plant.

8.9 FIRE AREA A-9 (TRAIN B RHR HEAT EXCHANGER ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area A-9. There is no fire suppression or detection installed in area A-9.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling all four steam generator ARVs from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Trains A and B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.10 FIRE AREA A-10 (TRAIN A RHR HEAT EXCHANGER ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area A-10. There is no fire suppression or detection installed in area A-10.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling all four steam generator ARVs from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.11 FIRE AREA A-11 (NORTH ELECTRICAL CHASE)

There are no 20 foot combustible and fire hazard free zones in fire area A-11. Fire area A-11 has automatic fire detection and suppression installed.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using the Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling all four steam generator ARVs from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using the Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. A fire in this area could cause a loss of inventory through the letdown flow path until the letdown isolation valves can be failed closed. The pressurizer spray valves could open until the valves can be failed closed. One pressurizer PORV may spuriously open and its associated block valve may not close. If this occurs, operators can close the PORV using the hand switch in the control room. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. In addition, the Train B motor driven auxiliary feed water pump (MDAFP) is available to supply auxiliary feed water to steam generators A and D. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown, however RHR pump suction may have to be lined up locally.

A fire in this area will not prevent safe shutdown of the plant.

8.12 FIRE AREA A-12 (SOUTH ELECTRICAL CHASE)

There are no 20 foot combustible and fire hazard free zones in fire area A-12. Fire area A-12 has automatic fire detection and suppression installed.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either the Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling all four steam generator ARVs from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using the Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown, but one valve in the RHR system may need to be manually closed.

A fire in this area will not prevent safe shutdown of the plant.

8.13 FIRE AREA A-13 (TRAIN B MOTOR DRIVEN AUXILIARY FEEDWATER PUMP)

There are no 20 foot combustible and fire hazard free zones in fire area A-13. Fire area A-13 has automatic fire detection installed but no suppression.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling steam generators A, C and D ARVs from the control room and locally controlling steam generator B ARV using the local controller. Steam generators A and D ARVs may need to be controlled manually from the control room. Two steam generator blowdown valves can be isolated from the main control room while the other two may need to be isolated from radwaste control room panel BM157. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through two steam generator blowdown lines and two steam generator atmospheric relief valve until operator action is taken to isolate these flow paths. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator C. Steam generator C ARV is available to control RCS temperature during hot standby. Steam generator B ARV may need to be controlled locally. Per Calculation WCNOC-CP-002, hot standby can be maintained using a single steam generator ARV and a spuriously opened ARV will not adversely impact safe shutdown. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Both Trains of residual heat removal (RHR) are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.14 FIRE AREA A-14 (TRAIN A MOTOR DRIVEN AUXILIARY FEEDWATER PUMP)

There are no 20 foot combustible and fire hazard free zones in fire area A-14. Fire area A-14 has automatic fire detection installed but no suppression.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling all four steam generators from the control room. Steam generator A ARV may need to be controlled manually from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric

relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and D. In addition, the turbine driven auxiliary feed water pump (TDAFP) is available but may be limited to supplying only steam generators B and C using Train B ESW as the water source. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Both Trains of residual heat removal (RHR) are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.15 FIRE AREA A-15 (TURBINE DRIVEN AUXILIARY FEEDWATER PUMP)

There are no 20 foot combustible and fire hazard free zones in fire area A-15. Fire area A-15 has automatic fire detection and a fixed manual fire suppression system installed.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Two of the four main steam isolation valves (MSIVs) may not close when control room hand switches are actuated. Main steam isolation is accomplished by closing valves downstream of the MSIVs using hand switches in the control room. Steam generators A, C and D atmospheric relief valve (ARV) control is accomplished using hand switches in the control room. Steam generator B ARV may need to be controlled using the local controller. Steam generator blowdown is isolated by closing all four blowdown valves from the control room, however two of the four steam generator blowdown valves may need to be isolated by disconnecting 125 VDC power to fail the valves closed. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through two steam generator blowdown lines, one steam generator atmospheric relief valve and two main steam isolation valves until operator action is taken to isolate these flow paths. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and D. Steam generators A and D ARVs are available to control RCS temperature during hot standby. Main feed water isolation valves (MFIVs) for steam generators A and D can be isolated from the control room. MFIVs for steam generators B and C may not close but flow diversion is prevented as long as steam generators A and D MFIVs are closed. Diagnostic instrumentation is available to verify RCS temperature and pressure. Both Trains of residual heat removal (RHR) are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.16 FIRE AREA A-16 (GENERAL AREA 2026 ELEVATION)

Fire area A-16 is divided into two sections. The North section (A-16 North) starts from approximately 2'-0" South of column line A7 and ends at the North wall at column line A1. The South section (A-16 South) starts at column line A14 and runs North to approximately 2'-0" South of column line A8. Area A-16 South also includes room 1402.

The area between A-16 North and A-16 South is a minimum of 20'-0" in width and is considered an area free of combustibles and fire hazards. The 20'-0" wide combustible/fire hazard free zone extends from the East wall of fire area A-9 to the West containment wall. This area shall be maintained free of combustibles and fire hazards at all times, except as approved in the fire hazard analysis.

Fire area A-16 is provided with automatic fire detection throughout and an automatic pre-action sprinkler system installed above cable tray concentrations.

8.16.1 FIRE AREA A-16 NORTH

PFSSD is assured using primarily Train B safety related and non-safety related equipment, except that the Train B motor driven auxiliary feed water pump (MDAFP) could be affected.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator A atmospheric relief valve (ARV) control is accomplished using the hand switch in the control room. Steam generators B and C ARVs may need to be controlled using the local controller. Steam generator D ARV may need to be closed locally. Steam generator blowdown is isolated by closing all four blowdown valves from radwaste control room panel BM157. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through all four steam generator blowdown lines and three steam generator atmospheric relief valves until operator action is taken to isolate these flow paths. Both pressurizer spray valves could open until operator action is taken in the control room to close the valves. Both pressurizer PORVs could open due to spurious high pressurizer pressure signals until action is taken in the control room to close the PORVs. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators B and C, however steam generators B and C ARVs may need to be controlled using the local controllers. A spurious swap over to ESW could occur due to potential damage to two of three suction pressure transmitter circuits that initiate swap over on 2/3 low suction pressure signals. This is acceptable for PFSSD since the Train A ESW system is unaffected. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown, however RHR pump suction may have to be lined up locally.

A fire in area A-16 North will not prevent safe shutdown of the plant.

8.16.2 FIRE AREA A-16 SOUTH

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling all four steam generator ARVs from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from radwaste control room panel BM157. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through all four steam generator blowdown lines until operator action is taken to isolate these flow paths. One pressurizer PORV may spuriously open and its associated block valve may not close. If this occurs, operators can close the PORV using the hand switch in the control room. The RWST could drain to the containment sump due to spurious opening of the Train B containment sump isolation valve until operator action is taken to isolate this drain down path. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using either Train A or Train B motor driven auxiliary feed water pumps (MDAFPs) or the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown, however RHR pump suction may have to be lined up locally.

A fire in area A-16 South will not prevent safe shutdown of the plant.

8.17 FIRE AREA A-17 (SOUTH ELECTRICAL PENETRATION ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area A-17. Fire area A-17 has automatic fire detection and a fixed automatic Halon fire suppression system installed.

PFSSD is assured using primarily Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using the Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling all four steam generator ARVs from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using the Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. One pressurizer PORV may spuriously open and its associated block valve may not close. If this occurs, operators can close the PORV using the hand switch in the control room. The Train B reactor head vent valves and Train B excess letdown valves could open, causing a loss of RCS inventory through these flow

paths. If this occurs, operators will need to increase charging flow to make up for the inventory loss. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using either Train A or Train B motor driven auxiliary feed water pumps (MDAFPs) or the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown, however RHR pump suction may have to be lined up locally.

A fire in this area will not prevent safe shutdown of the plant.

8.18 FIRE AREA A-18 (NORTH ELECTRICAL PENETRATION ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area A-18. Fire area A-18 has automatic fire detection and a fixed automatic Halon fire suppression system installed.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators A, C and D atmospheric relief valve (ARV) control is accomplished using the hand switches in the control room. Steam generator B ARV may need to be closed locally. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through one steam generator atmospheric relief valve until operator action is taken to isolate this flow path. A fire in this area could cause a loss of inventory through the letdown flow path until the letdown isolation valves can be failed closed. The pressurizer spray valves could open until the valves can be failed closed. One pressurizer PORV may spuriously open and its associated block valve may not close. If this occurs, operators can close the PORV using the hand switch in the control room. The Train A reactor head vent valves and Train A excess letdown valves could open, causing a loss of RCS inventory through these flow paths. If this occurs, operators will need to increase charging flow to make up for the inventory loss. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and D. Steam generators A and D ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown, however RHR pump suction may have to be lined up locally.

A fire in this area will not prevent safe shutdown of the plant.

8.19 FIRE AREA A-19 (GENERAL AREA 2047 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area A-19. Fire area A-19 has automatic fire detection installed.

PFSSD is assured using primarily Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators B, C and D atmospheric relief valve (ARV) control is accomplished using the hand switches in the control room. Steam generator A ARV may need to be closed locally. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through one steam generator atmospheric relief valve until operator action is taken to isolate this flow path. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator D, and the turbine driven auxiliary feed water pump (TDAFP), taking suction from the Train B essential service water (ESW) system, and supplying steam generators B, C and D. Steam generators B, C and D ARVs are available to control RCS temperature during hot standby. Steam generator A ARV may need to be locally closed. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown, however RHR pump suction may have to be lined up locally.

A fire in this area will not prevent safe shutdown of the plant.

8.20 FIRE AREA A-20 (CCW SURGE TANK AREA ELEVATION 2047)

There are no 20 foot combustible and fire hazard free zones in fire area A-20. Fire area A-20 has automatic fire detection installed near the elevator and near the containment personnel hatch.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling all four steam generator ARVs from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric

relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.21 FIRE AREA A-21 (TRAIN B CONTROL ROOM HVAC)

There are no 20 foot combustible and fire hazard free zones in fire area A-21. Fire area A-21 has automatic fire detection installed.

PFSSD is assured using primarily Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using the Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators A, B and C atmospheric relief valve (ARV) control is accomplished using the hand switches in the control room. Steam generator D ARV may need to be closed locally. Steam generator blowdown is isolated by closing all four blowdown valves from radwaste control room panel BM157. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using the Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through all four steam generator blowdown lines and one steam generator atmospheric relief valve until operator action is taken to isolate these flow paths. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators B and C, and the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator A. Steam generators A, B and C ARVs are available to control RCS temperature during hot standby. Steam generator D ARV may need to be locally closed. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown, however RHR pump suction may have to be lined up locally.

A fire in this area will not prevent a safe shutdown of the plant.

8.22 FIRE AREA A-22 (TRAIN A CONTROL ROOM HVAC)

There are no 20 foot combustible and fire hazard free zones in fire area A-22. Fire area A-22 has automatic fire detection installed.

PFSSD is assured using primarily Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators B, C and D atmospheric relief valve (ARV) control is accomplished using the hand switches in the control room. Steam generator A ARV may need to be closed locally. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through one steam generator atmospheric relief valve until operator action is taken to isolate this flow path. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator D, and the turbine driven auxiliary feed water pump (TDAFP), taking suction from the Train B essential service water (ESW) system, and supplying steam generators B, C and D. Steam generators B, C and D ARVs are available to control RCS temperature during hot standby. Steam generator A ARV may need to be locally closed. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent a safe shutdown of the plant.

8.23 FIRE AREA A-23 (MAIN STEAM AND FEEDWATER VALVE COMPARTMENT)

There are no 20 foot combustible and fire hazard free zones in fire area A-23. Fire area A-23 has automatic fire detection (flame detectors) installed. A 2-foot thick concrete barrier separates the west compartment from the east compartment. The west compartment consists of rooms 1411 and 1508 and the east compartment consists of rooms 1412 and 1509.

8.23.1 FIRE AREA A-23 EAST

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing valves downstream of the MSIVs using hand switches in the control room. Steam generators A and D atmospheric relief valves (ARVs) can be controlled from the control room. Steam generators B and C ARVs may need to be failed closed by disconnecting 120 VAC power to the controllers. Steam generator blowdown is isolated by closing all four blowdown valves from the control room, however two of the four steam generator blowdown

valves may need to be failed closed by disconnecting 125 VDC power to fail the valves closed. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through two steam generator blowdown lines, two steam generator atmospheric relief valves and two main steam isolation valves until operator action is taken to isolate these flow paths. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and D. Steam generators A and D ARVs are available to control RCS temperature during hot standby. Two main feed water isolation valves (MFIVs) can be isolated from the control room. The remaining two MFIVs may not close but flow diversion is prevented as long as two of the valves are closed. Diagnostic instrumentation is available to verify RCS temperature and pressure. Both Trains of residual heat removal (RHR) are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.23.2 FIRE AREA A-23 WEST

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing valves downstream of the MSIVs using hand switches in the control room. Steam generators B and C atmospheric relief valves (ARVs) can be controlled from the control room. Steam generators A and D ARVs may need to be failed closed by disconnecting 120 VAC power to the controllers. Steam generator blowdown is isolated by closing all four blowdown valves from the control room, however two of the four steam generator blowdown valves may need to be isolated by disconnecting 125 VDC power to fail the valves closed. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through two steam generator blowdown lines, two steam generator atmospheric relief valves and two main steam isolation valves until operator action is taken to isolate these flow paths. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the Train A motor driven auxiliary feed water pump (MDAFP) or the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators B and C. Steam generators B and C ARVs are available to control RCS temperature during hot standby. Two main feed water isolation valves (MFIVs) can be isolated from the control room. The remaining two MFIVs may not close but flow diversion is prevented as long as two of the valves are closed. Diagnostic instrumentation is available to verify RCS temperature and pressure. Both Trains of residual heat removal (RHR) are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.24 FIRE AREA A-24 (NORTH PIPE PENETRATION ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area A-24. Fire area A-24 has automatic fire detection installed.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using the Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators A, B and D atmospheric relief valve (ARV) control is accomplished using the hand switches in the control room. Steam generator C ARV may need to be closed locally. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using the Train B CCP taking suction from the RWST and injecting water through the RCP seals. If necessary, the boron injection tank (BIT) flow path will need to be manually aligned for transition from hot standby to cold shutdown. Pressurizer level reduction could occur due to uncontrolled cool down through one steam generator atmospheric relief valve until operator action is taken to isolate this flow path. No other inventory reduction paths are affected by a fire in this area.
Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and D. Steam generators A and D ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Both residual heat removal (RHR) trains are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.25 FIRE AREA A-25 (SOUTH PIPE PENETRATION ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area A-25. Fire area A-25 has automatic fire detection installed.

PFSSD is assured using Train A and Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling all four steam generator ARVs from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using either the Train A or Train B motor driven auxiliary feed water pump (MDAFP) or the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam

generator atmospheric relief valves (ARVs) are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Both Trains of residual heat removal (RHR) are available for transition from hot standby to cold shutdown, however RHR pump suction may have to be lined up locally.

A fire in this area will not prevent safe shutdown of the plant.

8.26 FIRE AREA A-26 (STORAGE AND I&C HOT TOOL SHOP 2026 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area A-26. Fire area A-26 has automatic fire detection installed.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator atmospheric relief valve (ARV) control is accomplished by controlling all four steam generator ARVs from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent a safe shutdown of the plant.

8.27 FIRE AREA A-27 (ROD DRIVE/MG SET ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area A-27. Fire area A-27 has automatic fire detection and a fixed automatic Halon fire suppression system installed.

PFSSD is assured using primarily Train B safety related and non-safety related equipment. However, since this area contains cables and equipment for both trains, Train A equipment may also be used.

Reactivity control is achieved by de-energizing the rod drive motor generators from the control room because the reactor trip breakers may be affected by the fire. Boration is available using the Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators A and D atmospheric relief valve (ARV) control is accomplished using hand switches in the control room. Steam generators B and C ARVs may need to be controlled using the local controllers. Steam generator blowdown is

isolated by closing all four blowdown valves from radwaste control room panel BM157. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using the Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through all four steam generator blowdown lines and two steam generator atmospheric relief valves until operator action is taken to isolate these flow paths. Both pressurizer spray valves could open until operator action is taken in the control room to close the valves. Both pressurizer PORVs may spuriously open. One pressurizer PORV block valve can be closed from the control room. Both PORVs can be closed using the hand switch in the control room. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and D. Steam generators A and D ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) is available for transition from hot standby to cold shutdown, however valves in the suction and discharge flow path may have to be lined up locally to support shutdown cooling.

A fire in this area will not prevent safe shutdown of the plant.

8.28 FIRE AREA A-28 (AUXILIARY SHUTDOWN PANEL ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area A-28. Fire area A-28 has automatic fire detection installed.

This fire area consists of two rooms that are separated by a 3-hour fire rated barrier. The North room contains the Train A auxiliary shutdown panel and the South room contains the Train B auxiliary shutdown panel. A fire in one room could impact the ability to achieve safe shutdown on the associated train, but the redundant train will remain available.

8.28.1 FIRE AREA A-28 NORTH

PFSSD is assured using Train A and Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators B and D atmospheric relief valve (ARV) control is accomplished using the hand switches in the control room. Steam generators A and C ARVs may need to be closed locally. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either the Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through two steam generator ARVs until operator action is taken to isolate this flow path. A fire in this area could cause a loss of inventory through the letdown flow path. Letdown will automatically isolate when pressurizer level reaches 17%. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator B and the Train B MDAFP taking suction from the CST and supplying steam generator D. Steam

generators B and D ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Both residual heat removal (RHR) trains are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.28.2 FIRE AREA A-28 SOUTH

PFSSD is assured using Train A and Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators A and C atmospheric relief valve (ARV) control is accomplished using the hand switches in the control room. Steam generators B and D ARVs may need to be closed locally. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either the Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through two steam generator ARVs until operator action is taken to isolate these flow paths. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the Train A MDAFP, taking suction from the condensate storage tank (CST), and supplying steam generator C. Steam generator C ARV is available to control RCS temperature during hot standby. Steam generator B ARV may need to be controlled locally. Per Calculation WCNOC-CP-002, hot standby can be maintained using a single steam generator ARV and a spuriously opened ARV will not adversely impact safe shutdown. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Both residual heat removal (RHR) trains are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.29 FIRE AREA A-29 (TRAIN B AUX FEEDWATER VALVE COMPARTMENTS/ACCUMULATOR TANK)

There are no 20 foot combustible and fire hazard free zones in fire area A-29. Fire area A-29 has no automatic fire detection or suppression installed.

PFSSD is assured using Train A and Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Steam generators A, B and D atmospheric relief valves (ARVs) can be controlled from the control room but the controller may have to be placed in manual. Steam generator C ARV may need to be controlled locally. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through all four steam generator ARVs until operator action is taken to isolate these flow paths. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the Train A MDAFP, taking suction from the CST, and supplying steam generator B. Steam generator B ARV is available to control RCS temperature during hot standby. Steam generator C atmospheric relief valve (ARV) may need to be controlled locally. Per Calculation WCNOC-CP-002, hot standby can be maintained using a single steam generator ARV and a spuriously opened ARV will not adversely impact safe shutdown. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.30 FIRE AREA A-30 (TRAIN A AUX FEEDWATER VALVE COMPARTMENTS/ACCUMULATOR TANK)

There are no 20 foot combustible and fire hazard free zones in fire area A-30. Fire area A-30 has no automatic fire detection or suppression installed.

PFSSD is assured using Train A and Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Steam generators A, B and D atmospheric relief valves (ARVs) can be controlled from the control room but the controllers may have to be placed in manual. Steam generator C ARV may need to be controlled locally. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through one steam generator ARV until operator action is taken to isolate this flow path. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the Train B motor driven auxiliary feed water pump (MDAFP) and the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and D. A spurious low auxiliary feed water (AFW) suction pressure signal could occur which would swap the AFW source to ESW. Steam generators A and D ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.31 FIRE AREA A-31

Fire Area A-31 does not exist.

8.32 FIRE AREA A-32

Fire Area A-32 does not exist.

8.33 FIRE AREA A-33 (AUX FEEDWATER PIPE SPACE)

This area has a 20 foot combustible and fire hazard free zone between valves ALHV0032 and ALHV0033. In addition, where cables associated with ALHV0032 are run within 20 feet of redundant components, the cables are enclosed with a qualified 1-hour fire barrier. The horizontal separation and 1-hour fire barrier, along with automatic fire suppression and detection throughout the area meets Wolf Creek's commitments to 10CFR50, Appendix R, Section III.G.2.b.

PFSSD is assured using Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and D. A spurious low auxiliary feed water (AFW) suction pressure signal could occur which would swap the AFW source to ESW. Steam generators A and D ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.34 FIRE AREA A-34 (SEAL WATER HEAT EXCHANGER ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area A-34. Fire area A-34 has no automatic fire detection or suppression installed.

PFSSD is assured using Train A and Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.35 FIRE AREA AB-1 (AUXILIARY BOILER ROOM)

There are no PFSSD components or cables in this area. This area is separated from adjoining safe shutdown areas by a 3-hour-rated barrier. Consequently, a fire in area AB-1 will not prevent safe shutdown of the plant.

8.36 FIRE AREA C-1 (PIPE SPACE AND TANK AREA/STAIRWELL FROM ACCESS CONTROL)

Fire Area C-1 is divided into two sections, C-1 North and C-1 South. Redundant PFSSD components within fire areas C-1 North and C-1 South are divided by a 20 foot combustible and fire hazard free zone. This horizontal separation along with automatic fire suppression and detection meets Wolf Creek's commitments to 10CFR50, Appendix R, Section III.G.2.b.

8.36.1 FIRE AREA C-1 NORTH

PFSSD is assured using primarily Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in area C-1 North will not prevent safe shutdown of the plant.

8.36.2 FIRE AREA C-1 SOUTH

PFSSD is assured using primarily Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in area C-1 South will not prevent safe shutdown of the plant.

8.37 FIRE AREA C-2 (NORTH SMALL ELECTRICAL CHASE 1974 ELEVATION)

There are no safe shutdown circuits or equipment in this area. Consequently, a fire in area C-2 will not prevent safe shutdown of the plant.

8.38 FIRE AREA C-3 (SOUTH SMALL ELECTRICAL CHASE 1974 ELEVATION)

There are no safe shutdown circuits or equipment in this area. Consequently, a fire in area C-3 will not prevent safe shutdown of the plant.

8.39 FIRE AREA C-4

Fire Area C-4 does not exist.

8.40 FIRE AREA C-5 (ACCESS CONTROL NORTH)

There are no 20 foot combustible and fire hazard free zones in fire area C-5. Fire area C-5 has automatic fire detection and suppression installed.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP) or the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.41 FIRE AREA C-6 (ACCESS CONTROL SOUTH)

There are no 20 foot combustible and fire hazard free zones in fire area C-6. Fire area C-6 has automatic fire detection and suppression installed.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train A motor driven auxiliary feed water pump (MDAFP) or the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.42 FIRE AREA C-7 (NORTH SMALL ELECTRICAL CHASE 1984 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-7. Fire area C-7 has automatic fire detection and suppression installed.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. A fire in this area could cause a loss of inventory through the letdown flow path until the letdown isolation valves can be failed closed. The pressurizer spray valves could open until the valves can be failed closed. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.43 FIRE AREA C-8 (SOUTH SMALL ELECTRICAL CHASE 1984 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-8. Fire area C-8 has automatic fire detection and suppression installed.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric

relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.44 FIRE AREA C-9 (TRAIN A ESF SWITCHGEAR ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area C-9. Fire area C-9 has automatic fire detection and Halon fire suppression installed.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and D. Steam generators A and D ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.45 FIRE AREA C-10 (TRAIN B ESF SWITCHGEAR ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area C-10. Fire area C-10 has automatic fire detection and Halon fire suppression installed.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators A and C atmospheric relief

valve (ARV) control is accomplished using hand switches in the control room. Steam generator B ARV may need to be controlled using the local controller. Steam generator D ARV may need to be locally closed. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through two steam generator atmospheric relief valves until operator action is taken to isolate these flow paths. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator C. Steam generator C ARV is available to control RCS temperature during hot standby. Steam generator B ARV may need to be controlled locally. Per Calculation WCNOC-CP-002, hot standby can be maintained using a single steam generator ARV and a spuriously opened ARV will not adversely impact safe shutdown. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not affect safe shutdown of the plant.

8.46 FIRE AREA C-11 (SOUTH LARGE ELECTRICAL CHASE 2000 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-11. Fire area C-11 has automatic fire detection and suppression installed.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators A, B and C atmospheric relief valve (ARV) control is accomplished using hand switches in the control room. Steam generator D ARV may need to be locally closed. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through one steam generator atmospheric relief valves until operator action is taken to isolate this flow path. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators B and C. Alternatively, the turbine driven auxiliary feed water pump is available to supply steam generators A, C and D. Steam generators A, B and C ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not affect safe shutdown of the plant.

8.47 FIRE AREA C-12 (NORTH LARGE ELECTRICAL CHASE 2000 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-12. Fire area C-12 has automatic fire detection and suppression installed.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. A fire in this area could cause a loss of inventory through the letdown flow path until the letdown isolation valves can be failed closed. The pressurizer spray valves could open until the valves can be failed closed. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP) or the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.48 FIRE AREA C-13 (TRAIN B CLASS 1E ELECTRICAL EQUIPMENT ROOM COOLER)

There are no 20 foot combustible and fire hazard free zones in fire area C-13. Fire area C-13 has automatic fire detection installed.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the Train A motor driven auxiliary feed water pump (MDAFP) and the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.49 FIRE AREA C-14 (TRAIN A CLASS 1E ELECTRICAL EQUIPMENT ROOM COOLER)

There are no 20 foot combustible and fire hazard free zones in fire area C-14. Fire area C-14 has automatic fire detection installed.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the Train B motor driven auxiliary feed water pump (MDAFP) and the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.50 FIRE AREA C-15 (TRAIN B CLASS 1E/NON-CLASS 1E ELECTRICAL SWITCHGEAR AND BATTERY ROOMS)

There are no 20 foot combustible and fire hazard free zones in fire area C-15. Fire area C-15 has automatic fire detection and Halon fire suppression installed.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators A and C atmospheric relief valve (ARV) control is accomplished using hand switches in the control room. Steam generators B and D ARVs may lose power and fail closed but will not need to be locally closed. Steam

generator blowdown is isolated by closing all four blowdown valves from the control room. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators B and C. However, only steam generators A and C ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Loops 1 and 2 hot leg temperature indication is available. Remaining RCS temperature instruments are unavailable. Pressurizer pressure indication is available using all four pressurizer pressure indicators. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.51 FIRE AREA C-16 (TRAIN A CLASS 1E/NON-CLASS 1E ELECTRICAL SWITCHGEAR AND BATTERY ROOMS)

There are no 20 foot combustible and fire hazard free zones in fire area C-16. Fire area C-16 has automatic fire detection and Halon fire suppression installed.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators B and D atmospheric relief valve (ARV) control is accomplished using hand switches in the control room. Steam generators A and C ARVs may lose power and fail closed but will not need to be locally closed. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and D, and the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A, B, C and D. Steam generators B and D ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Hot leg temperature indication on loops 3 and 4 and cold leg temperature indication on loops 1 and 2 are available. Remaining RCS temperature instruments are unavailable. Pressurizer pressure indication is available using all four pressurizer pressure indicators. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.52 FIRE AREA C-17 (SOUTH LARGE ELECTRICAL CHASE 2016 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-17. Fire area C-17 has automatic fire detection and suppression installed.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators A, B and C atmospheric relief valve (ARV) control is accomplished using hand switches in the control room. Steam generator D ARV may need to be locally closed. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through one steam generator atmospheric relief valve until operator action is taken to isolate this flow path. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators B and C, and the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator A. Steam generators A, B and C ARVs are available to control RCS temperature during hot standby. Steam generator D ARV may need to be closed locally. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.53 FIRE AREA C-18 (NORTH LARGE ELECTRICAL CHASE 2016 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-18. Fire area C-18 has automatic fire detection and suppression installed.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators B, C and D atmospheric relief valve (ARV) control is accomplished using hand switches in the control room. Steam generator A ARV may need to be locally closed. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through one steam generator atmospheric relief valve until operator action is taken to isolate this flow path. A fire in this area could cause a loss of inventory through the letdown flow path until the letdown isolation valves can be failed closed. The pressurizer spray valves could open until the valves can be failed closed. One pressurizer PORV may spuriously open and its associated block valve may not close. If this occurs, operators can close

the PORV using the hand switch in the control room. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator D, and the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators B and C. Steam generators B, C and D ARVs are available to control RCS temperature during hot standby. Steam generator A ARV may need to be closed locally. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.54 FIRE AREA C-19 (NORTH SMALL ELECTRICAL CHASE 2016 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-19. Fire area C-19 has automatic fire detection and suppression installed.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Steam generators A, B and D atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator C ARV may fail closed due to loss of power but will not spuriously open. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying steam generators A, B and D. Steam generators A, B and D ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.55 FIRE AREA C-20 (SOUTH SMALL ELECTRICAL CHASE 2016 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-20. Fire area C-20 has automatic fire detection and suppression installed.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Steam generators A, C and D atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator B ARV may need to be closed locally. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through one steam generator atmospheric relief valve until operator action is taken to isolate this flow path. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and D, and the Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the CST, and supplying steam generators B and C. Steam generators A, C and D ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.56 FIRE AREA C-21 (LOWER CABLE SPREADING ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area C-21. Fire area C-21 has automatic fire detection and suppression installed.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators B and D atmospheric relief valve (ARV) control is accomplished using hand switches in the control room. Steam generators A and C ARVs may need to be locally closed. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through two steam generator atmospheric relief valves until operator action is taken to isolate this flow path. A fire in this area could cause a loss of inventory through

the letdown flow path until the letdown isolation valves can be failed closed. The pressurizer spray valves could open until the valves can be failed closed. One pressurizer PORV may spuriously open and its associated block valve may not close. If this occurs, operators can close the PORV using the hand switch in the control room. The containment spray pumps could operate and deplete inventory in the RWST until operator action is taken to stop the pumps. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator D, and the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator B. Steam generators B and D ARVs are available to control RCS temperature during hot standby. Steam generators A and C ARVs may need to be closed locally. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.57 FIRE AREA C-22 (UPPER CABLE SPREADING ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area C-22. Fire area C-22 has automatic fire detection and suppression installed.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators A and C atmospheric relief valve (ARV) control is accomplished using hand switches in the control room. Steam generators B and D ARVs may need to be locally closed or controlled. Steam generator blowdown is isolated by closing all four blowdown valves from radwaste control room panel BM157. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through all four steam generator blowdown lines and two steam generator atmospheric relief valves until operator action is taken to isolate these flow paths. One pressurizer PORV may spuriously open and its associated block valve may not close. If this occurs, operators can close the PORV using the hand switch in the control room. One containment spray pump could operate and deplete inventory in the RWST until operator action is taken to stop the pump. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator C. Steam generator C ARV is available to control RCS temperature during hot standby. Per Calculation WCNOC-CP-002, hot standby can be maintained using a single steam generator ARV and a spuriously opened ARV will not adversely impact safe shutdown. Steam generator B ARV may need to be controlled locally or at the auxiliary shutdown panel. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown, however RHR pump suction may have to be opened locally and RHR to SI hot leg loops 2 and 3 may have to be closed locally.

A fire in this area will not prevent safe shutdown of the plant.

8.58 FIRE AREA C-23 (SOUTH LARGE ELECTRICAL CHASE 2032 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-23. Fire area C-23 has automatic fire detection and suppression installed.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators A, B and C atmospheric relief valve (ARV) control is accomplished using hand switches in the control room. Steam generator D ARV may need to be locally closed. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through one steam generator atmospheric relief valve until operator action is taken to isolate this flow path. One pressurizer PORV may spuriously open and its associated block valve may not close. If this occurs, operators can close the PORV using the hand switch in the control room. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators B and C, and the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator A. Steam generators A, B and C ARVs are available to control RCS temperature during hot standby. Steam generator D ARV may need to be closed locally. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown, however RHR pump suction may have to be lined up locally and RHR to SI hot leg injection loops 2 and 3 may need to be closed locally to support shutdown cooling.

A fire in this area will not prevent safe shutdown of the plant.

8.59 FIRE AREA C-24 (NORTH LARGE ELECTRICAL CHASE 2032 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-24. Fire area C-24 has automatic fire detection and suppression installed.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators B, C and D atmospheric relief valve (ARV) control is accomplished using hand switches in the control room. Steam generator A ARV may need to be locally closed. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to

uncontrolled cool down through one steam generator atmospheric relief valve until operator action is taken to isolate this flow path. A fire in this area could cause a loss of inventory through the letdown flow path until the letdown isolation valves can be failed closed. The pressurizer spray valves could open until the valves can be failed closed. One pressurizer PORV may spuriously open and its associated block valve may not close. If this occurs, operators can close the PORV using the hand switch in the control room. One containment spray pump could operate and deplete inventory in the RWST until operator action is taken to stop the pump. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator D. The turbine driven auxiliary feed water pump (TDAFP) is also available but it may be limited to supplying only steam generators B and C. Steam generators B, C and D ARVs are available to control RCS temperature during hot standby. Steam generator A ARV may need to be closed locally. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown, however RHR pump suction may have to be lined up locally.

A fire in this area will not prevent safe shutdown of the plant.

8.60 FIRE AREA C-25 (SOUTH SMALL ELECTRICAL CHASE 2032 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-25. Fire area C-25 has automatic fire detection and suppression installed.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Steam generators A, C and D atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator B ARV may need to be closed locally. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through one steam generator atmospheric relief valve until operator action is taken to isolate this flow path. One pressurizer PORV could spuriously open until operator action is taken in the control room to close the PORV. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and D, and the Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators B and C. Steam generators A, C and D ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.61 FIRE AREA C-26 (NORTH SMALL ELECTRICAL CHASE 2032 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-26. Fire area C-26 has automatic fire detection and suppression installed.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Steam generators A, B and D atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator C ARV may need to be locally closed. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. Both pressurizer spray valves could open until operator action is taken in the control room to close the valves. One pressurizer PORV could spuriously open until operator action is taken in the control room to close the PORV. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying steam generators A, B and D. Steam generators A, B and D ARVs are available to control RCS temperature during hot standby. Steam generator C ARV may need to be locally closed. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.62 FIRE AREA C-27 (CONTROL ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area C-27. Fire area C-27 has automatic fire detection installed. Automatic Halon fire suppression is installed in the cable trenches.

Document E-1F9915 provides the design basis for control room evacuation procedure OFN RP-017. In the event of a fire in the control room that requires evacuation and shutdown from outside the control room, OFN RP-017 will successfully shut down the plant based on the evaluation in E-1F9915.

Cold shutdown from outside the control room is achieved using procedure OFN RP-017A, Hot Standby to Cold Shutdown from Outside the Control Room due to Fire.

A fire in this area will not prevent safe shutdown of the plant.

8.63 FIRE AREA C-28 (SERVICE AREA BY CONTROL ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area C-28. Fire area C-28 has automatic fire detection installed in the Pantry (Room 3602) and the Janitors Closet (Room 3608). No detection is installed in the toilet (Room 3607). This area is not equipped with automatic suppression.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.64 FIRE AREA C-29 (SAS ROOM)

There are no safe shutdown circuits or equipment in this area. Consequently, a fire in area C-29 will not prevent safe shutdown of the plant.

8.65 FIRE AREA C-30 (SOUTH LARGE ELECTRICAL CHASE 2047 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-30. Fire area C-30 has automatic fire detection and suppression installed.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators A, B and C atmospheric relief valve (ARV) control is accomplished using hand switches in the control room. Steam generator D ARV may need to be locally closed. Steam generator blowdown is isolated by closing all four blowdown valves from radwaste control room panel BM157. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through all four steam generator blowdown lines and one steam generator atmospheric relief valve until operator action is taken to isolate these flow paths. One pressurizer PORV may spuriously open and its associated block valve may not close. If this occurs, operators can close the PORV using the hand switch in the control room. One containment spray pump could operate and deplete inventory in the RWST until operator action is taken to stop the pump. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators B and C. Steam generators B and C ARVs are available to control RCS temperature during hot standby. Steam generator D ARV may need to be closed locally. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown, however RHR pump suction may have to be lined up locally and RHR to SI hot leg injection loops 2 and 3 may need to be closed locally to support shutdown cooling.

A fire in this area will not prevent safe shutdown of the plant.

8.66 FIRE AREA C-31 (NORTH LARGE ELECTRICAL CHASE 2047 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-31. Fire area C-31 has automatic fire detection and suppression installed.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators B, C and D atmospheric relief valve (ARV) control is accomplished using hand switches in the control room. Steam generator A ARV may need to be locally closed. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through one steam generator atmospheric relief valve until operator action is taken to isolate this flow path. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator D, and the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators B, C and D. Steam generators B, C and D ARVs are available to control RCS temperature during hot standby. Steam generator A ARV may need to be closed locally. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.67 FIRE AREA C-32 (SOUTH SMALL ELECTRICAL CHASE 2047 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-32. Fire area C-32 has automatic fire detection and suppression installed.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Steam generators A, C and D atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator B ARV may need to be closed locally. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through one steam generator atmospheric relief valve until operator action is taken to isolate this flow path. One pressurizer PORV could spuriously open until operator action is taken in the control room to close the PORV. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and D, and the Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators B and C. Steam generators A, C and D ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.68 FIRE AREA C-33 (SOUTH LARGE ELECTRICAL CHASE 2073 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-33. Fire area C-33 has automatic fire detection and suppression installed.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generators A, B and C atmospheric relief valve (ARV) control is accomplished using hand switches in the control room. Steam generator D ARV may need to be locally closed. Steam generator blowdown is isolated by closing all four blowdown valves from radwaste control room panel BM157. Source range neutron flux monitoring is available.

Reactor coolant makeup is achieved using Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction could occur due to uncontrolled cool down through all four steam generator blowdown lines and one steam generator atmospheric relief valve until operator action is taken to isolate these flow paths. One

pressurizer PORV may spuriously open and its associated block valve may not close. If this occurs, operators can close the PORV using the hand switch in the control room. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators B and C. Steam generators B and C ARVs are available to control RCS temperature during hot standby. Steam generator D ARV may need to be closed locally. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown, however RHR pump suction may have to be lined up locally and RHR to SI hot leg injection loops 2 and 3 may need to be closed locally to support shutdown cooling.

A fire in this area will not prevent safe shutdown of the plant.

8.69 FIRE AREA C-34 (SOUTH SMALL ELECTRICAL CHASE 2073 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-34. Fire area C-34 has automatic fire detection and suppression installed.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Steam generators A, C and D atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator B ARV may fail closed due to loss of power but will not spuriously open. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and D, and the Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator C. Steam generators A, C and D ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.70 FIRE AREA C-35 (CORRIDOR 2016 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-35. Fire area C-35 has no automatic fire detection or suppression installed.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment. However, Train B Class 1E electrical equipment room cooling could be affected, potentially causing a loss of Train B Class 1E electrical equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Steam generators A and C atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using the Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator C or the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and C. Steam generators A and C ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.71 FIRE AREA C-36 (SOUTH SMALL ELECTRICAL CHASE 2000 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-36. Fire area C-36 has automatic suppression installed but no fire detection.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Steam generators A, C and D atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator B ARV may need to be closed locally. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric

relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the Train B motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generators A and D, and the Train A motor driven auxiliary feed water pump (MDAFP), taking suction from the condensate storage tank (CST), and supplying steam generator C. Steam generators A, C and D ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.72 FIRE AREA C-37 (NORTH SMALL ELECTRICAL CHASE 2000 ELEVATION)

There are no 20 foot combustible and fire hazard free zones in fire area C-37. Fire area C-37 has automatic suppression installed but no fire detection.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.73 FIRE AREA CST (YARD AREA AROUND THE CST)

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. An exposure fire will not likely cause failure of the CST. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.74 FIRE AREAS CC-1, T-1, T-2 AND TURB (COMMUNICATION CORRIDOR AND TURBINE BUILDING ALL ELEVATIONS EXCEPT FIRE AREAS T-4 AND T-10)

There are no 20 foot combustible and fire hazard free zones in fire areas CC-1, T-1, T-2 or TURB. Except for the Communication Corridor (CC-1), The South stairway (T-1), and the Turbine Building operating floor (El. 2065-0) these areas are protected with automatic fire suppression and detection. Fire area T-1 has an automatic smoke detector installed at the top of the stairway. Portions of the Communication Corridor are provided with automatic detection.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.75 FIRE AREA D-1 (TRAIN A DIESEL GENERATOR ROOM EAST)

There are no 20 foot combustible and fire hazard free zones in fire area D-1. Fire area D-1 has automatic fire detection and suppression installed in the Diesel Generator Room.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room initially. However, due to the potential loss of Train A power, only two of the four ARVs may be available after the nitrogen supply is depleted. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available initially. However, only the Train B source range monitors may be available long term due to the potential loss of Train A power.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the TDAFP or the Train B MDAFP, taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. However, as stated above, only two ARVs may be available long term. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.76 FIRE AREA D-2 (TRAIN B DIESEL GENERATOR ROOM WEST)

There are no 20 foot combustible and fire hazard free zones in fire area D-2. Fire area D-2 has automatic fire detection and suppression installed in the Diesel Generator Room.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main

steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using the TDAFP or the Train A MDAFP, taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.77 FIRE AREA ESWA (TRAIN A ESSENTIAL SERVICE WATER PUMPHOUSE, ELECTRICAL VAULTS AND DUCT BANKS)

There are no 20 foot combustible and fire hazard free zones in fire area ESWA. Fire area ESWA has automatic fire detection installed but no suppression.

PFSSD is assured using Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train B motor driven auxiliary feed water pump (MDAFP) or the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train B residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.78 FIRE AREA ESWB (TRAIN B ESSENTIAL SERVICE WATER PUMPHOUSE, ELECTRICAL VAULTS AND DUCT BANKS)

There are no 20 foot combustible and fire hazard free zones in fire area ESWB. Fire area ESWB has automatic fire detection installed but no suppression.

PFSSD is assured using Train A safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using Train A centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using Train A CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using Train A motor driven auxiliary feed water pump (MDAFP) or the turbine driven auxiliary feed water pump (TDAFP), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A residual heat removal (RHR) system is available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.79 FIRE AREA ESWV (ESSENTIAL SERVICE WATER VAULTS)

There are no safe shutdown circuits or equipment in this area. Consequently, a fire in area ESWV will not prevent safe shutdown of the plant.

8.80 FIRE AREA F-1 (FUEL BUILDING GENERAL AREAS)

There are no 20 foot combustible and fire hazard free zones in fire area F-1. Fire area F-1 has automatic fire detection (flame detectors) installed on the operating floor. An automatic pre-action sprinkler system, actuated by heat detectors, is installed above the railroad bay.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.81 FIRE AREA F-2 (TRAIN B FUEL POOL COOLING HEAT EXCHANGER ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area F-2. Fire area F-2 has automatic fire detection installed but no suppression.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.82 FIRE AREA F-3 (TRAIN A FUEL POOL COOLING HEAT EXCHANGER ROOM)

There are no safe shutdown circuits or equipment in this area. Consequently, a fire in area F-3 will not prevent safe shutdown of the plant.

8.83 FIRE AREA F-4 (FUEL BUILDING AIR HANDLING EQUIPMENT ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area F-4. Fire area F-4 has automatic fire detection installed but no suppression.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.84 FIRE AREA F-5 (FUEL BUILDING ELECTRICAL EQUIPMENT ROOM)

There are no 20 foot combustible and fire hazard free zones in fire area F-5. Fire area F-5 has automatic fire detection installed but no suppression.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.85 FIRE AREA F-6 (FUEL BUILDING EMERGENCY EXHAUST EQUIPMENT ROOM EAST)

There are no safe shutdown circuits or equipment in this area. Consequently, a fire in area F-6 will not prevent safe shutdown of the plant.

8.86 FIRE AREA F-7 (FUEL BUILDING EMERGENCY EXHAUST EQUIPMENT ROOM WEST)

There are no 20 foot combustible and fire hazard free zones in fire area F-7. Fire area F-7 has automatic fire detection installed, but no suppression.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.87 FIRE AREA HMS-1 (HOT MACHINE SHOP)

There are no safe shutdown circuits or equipment in this area. Consequently, a fire in area HMS-1 will not prevent safe shutdown of the plant.

8.88 FIRE AREA RB (REACTOR BUILDING) (RB-1 THROUGH RB-11)

The reactor building is divided into 11 separate fire areas in the fire hazards analysis (RB-1 through RB-11). However, for the purposes of the PFSSD analysis, the reactor building is treated as one fire area, which is designated as fire area RB.

There are no designated 20 foot combustible and fire hazard free zones in fire area RB. During power operations, combustible loading is limited to that allowed by administrative procedures and is only allowed in designated areas, usually within metal containers. The reactor building is a locked high radiation area during power operations, so access is limited and combustible material quantities entering the building can be closely monitored. Fire detection using linear heat detection is installed on most cable trays in the building and above each reactor coolant pump. A manually charged fixed fire suppression system and linear heat detection is installed in each cable penetration area.

A number of redundant PFSSD components and associated circuits are located in the reactor building. Some circuits have fire wrap installed to meet the requirements of 10CFR50, Appendix R, Section III.G.2.f for a radiant energy shield. Other circuits are separated from their redundant counterpart by at least 20 feet of horizontal separation with limited or no combustibles and fire hazards.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors could be affected but at least one will be available because of spatial separation between monitors and cables.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. A fire in this area could cause a loss of inventory through the letdown and excess letdown flow paths until the letdown isolation valves and excess letdown isolation valves can be failed closed. The pressurizer spray valves could open until the valves can be failed closed. Both pressurizer PORVs may spuriously open and their associated block valves may not close. If this occurs, both PORVs can be closed from the control room. No other inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown, however RHR pump suction may have to be lined up locally.

A fire in this area will not prevent safe shutdown of the plant.

8.89 FIRE AREA RW (RADWASTE BUILDING) (RWA, RWB & RWC)

There are no 20 foot combustible and fire hazard free zones in fire area RW. Fire area RW has automatic fire detection installed and an automatic wet pipe sprinkler system in the dry waste compactor area.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.90 FIRE AREA RW-1 (RADWASTE TUNNEL)

This area consists of a radioactive tunnel and a non-radioactive personnel access tunnel. There are no 20 foot combustible and fire hazard free zones in fire area RW-1. Fire area RW-1 has automatic fire detection installed in the non-radioactive tunnel but no suppression. The radioactive tunnel has no detection or suppression installed.

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric

relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.91 FIRE AREA RWST (YARD AREA AROUND THE RWST)

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). An exposure fire will not likely cause failure of the RWST. All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. An exposure fire will not likely cause failure of the RWST. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.92 FIRE AREA T-4 (LUBE OIL STORAGE TANKS)

There are no safe shutdown circuits or equipment in this area. Consequently, a fire in area T-4 will not prevent safe shutdown of the plant.

8.93 FIRE AREA T-10 (LUBE OIL RESERVOIR ROOM)

There are no safe shutdown circuits or equipment in this area. Consequently, a fire in area T-10 will not prevent safe shutdown of the plant.

8.94 FIRE AREA YARD (GENERAL YARD AREAS)

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.95 FIRE AREA YARD – ESF (YARD1 IN E-15000) (YARD AREA AROUND ESF TRANSFORMERS)

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and

Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

8.96 FIRE AREA YARD – MAIN (YARD2 IN E-15000) (YARD AREA AROUND MAIN TRANSFORMERS)

There are no safe shutdown circuits or equipment in this area. Consequently, a fire in area YARD – MAIN will not prevent safe shutdown of the plant.

8.97 FIRE AREA YARD – SU (YARD3 IN E-15000) (YARD AREA AROUND START UP TRANSFORMER)

PFSSD is assured using either Train A or Train B safety related and non-safety related equipment.

Reactivity control is achieved by tripping the reactor from the control room. Boration is available using either Train A or Train B centrifugal charging pump (CCP) taking suction from the refueling water storage tank (RWST) and injecting borated water through the reactor coolant pump (RCP) seals and boron injection tank (BIT). All four steam generator atmospheric relief valves (ARVs) can be controlled from the control room. Main steam isolation is accomplished by closing the main steam isolation valves (MSIVs) from the control room. Steam generator blowdown is isolated by closing all four blowdown valves from the control room. All four source range neutron flux monitors are available.

Reactor coolant makeup is achieved using either Train A or Train B CCP taking suction from the RWST and injecting water through the RCP seals and BIT. Pressurizer level reduction due to uncontrolled cool down through steam generator blowdown lines, steam generator atmospheric relief valves and main steam lines would not be caused by a fire in this area. No inventory reduction paths are affected by a fire in this area.

Decay heat removal is achieved using all three auxiliary feed water pumps (AFPs), taking suction from the condensate storage tank (CST), and supplying all four steam generators. All four steam generator ARVs are available to control RCS temperature during hot standby. Main feed water is isolated by closing the main feed water isolation valves (MFIVs) from the control room. Diagnostic instrumentation is available to verify RCS temperature and pressure. Train A and Train B residual heat removal (RHR) systems are available for transition from hot standby to cold shutdown.

A fire in this area will not prevent safe shutdown of the plant.

FIRE AREA A-1

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-1 is located on the 1974 and 1988 elevations of the Auxiliary Building and includes the rooms listed in Table A-1-1.

Table A-1-1
Rooms Located in Fire Area A-1

ROOM #	DESCRIPTION
1101	General Floor Area (No. 1)
1102	Chiller & Surge Tanks Area
1103	Letdown Chiller Heat Exchanger Room
1104	Letdown Reheat Heat Exchanger Room
1105	Valve Compartment
1106	Moderating Heat Exchanger Room
1115	Normal Charging Pump Room
1120	General Floor Area (No. 2)
1121	Access Pit
1122	General Floor Area (No. 3)
1123	Passage
1124	Valve Compartment
1125	Letdown Heat Exchanger Room
1128	Unassigned Space
1129	Auxiliary Steam Condensate Recovery & Storage Tank
1130	North Corridor
1201	Vestibule
1202	Access Area (B) & Chiller Surge Tank
1203	Pipe Space (B)
1203A	South Electrical Chase
1204	Pipe Space (A)
1205	Access Area (A)

An automatic pre-action sprinkler system is installed over concentrations of cable in cable trays. Automatic fire detection is installed throughout the area. The automatic suppression and detection system meets the intent of 10CFR50, Appendix R Section III.G.2.c.

Where redundant circuits are run through area A-1, circuits associated with the protected components are wrapped with a raceway fire barrier material meeting the requirements for a 1-hour fire rating. This fire barrier, along with automatic suppression and detection installed in the area, provides reasonable assurance that PFSSD can be achieved.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-1-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-1

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. Both Motor Driven Auxiliary Feedwater Pumps could be inoperable. The Turbine Driven Auxiliary Feedwater Pump (TDAFP) is available to supply feedwater to the steam generators. Valves ALHV0009 and ALHV0011 may lose power, causing loss of control of AFW from Train A MDAFP to SGs B and C. The TDAFP is available to supply all four steam generators. Condensate Storage Tank (CST) level indication is available.
AP	Condensate Storage System	H	The condensate storage system is available to supply water to the TDAFP.
BB	Reactor Coolant System	R, M, H, P, S	All PFSSD functions associated with the reactor coolant system are satisfied. RCS pressure indication is available using BBPI0405. When transferring to RHR, valve BBPV8702A may need to be manually opened, or a cold shutdown repair performed, to provide a suction source from the RCS to RHR pump A. All four reactor coolant pumps may not stop using the control room hand switch. RCP seal injection and thermal barrier cooling remain available. Therefore, the inability to stop the RCPs will have no adverse impact on PFSSD. Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, pressurizer spray can be stopped by closing KAFV0029 using KAHIS0029 in the main control room. Pressurizer pressure indication is available using BBPI0455A, BBPI0456, BBPI0457 or BBPI0458. Pressurizer level indication is available using BBLI0459A and BBLI0460A.
BG	Chemical and Volume Control System	R, M, S	PFSSD functions associated with the chemical and volume control system are satisfied. Train A Centrifugal Charging Pump (CCP) is available to provide charging flow from the RWST to the RCP seals. VCT to CCP valve BGLCV0112B will automatically close. Excess letdown isolation valves will remain closed. Letdown isolation valves BGLCV0459 and BGLCV0460 and letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C may need to be failed closed by closing valve KAFV0029 using KAHIS0029 in the main control room. RCP seal injection flow transmitters BGFT0215A and BGFT0215B could be affected. The component cooling water system is unaffected and RCP thermal barrier cooling remains available.

Table A-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-1

System	System Name	PFSSD Function*	Comments
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blowdown system are satisfied. Steam generator blowdown is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A, located on RL024 in the Main Control Room.
BN	Borated Refueling Water Storage System	R, M, H	The RWST is available to provide a suction source to Centrifugal Charging Pump A via valve BNLCV0112D. RWST level indication is available using all four level indicators. When initiating RHR, flow from the RWST to RHR pump A can be isolated using BNHV8812A.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
EJ	Residual Heat Removal System	M, H, P	All PFSSD functions associated with the Residual Heat Removal (RHR) system are satisfied. Loss of RCS inventory through the RHR flow path is prevented by maintaining valves EJHV8701A and EJHV8701B closed. RHR Train A is available via RCS suction valve EJHV8701A and discharge valves EJHCV0606 and EJHV8809A. RHR pump A mini-flow valve EJFCV0610 is available. RHR system flow diagnostic instrumentation is available using various available temperature indicators.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
FC	Auxiliary Turbines	R, H, P	All PFSSD functions associated with the Auxiliary Turbines are satisfied. The TDAFP is used for a fire in area A-1.

Table A-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-1

System	System Name	PFSSD Function*	Comments
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
GL	Auxiliary Building HVAC	S	The PFSSD Support function associated with the Auxiliary Building HVAC system is satisfied. Train A CCP room cooler SGL12A is available. Train A RHR pump room cooler SGL10A is available.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.

Table A-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-1

System	System Name	PFSSD Function*	Comments
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
PA	13.8kV	S	Breakers PA0106 and PA0207 could trip. This will not affect PFSSD since redundant capability is available.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
PK	125VDC	S	Class 1E 480 VAC power to inverter PK24 could be disrupted. Battery rack PK14 is unaffected and is available to supply short-term 125 VDC power to bus PK04.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
QD	Emergency Lighting	S	Emergency lighting for PFSSD outside the control room is provided by self-contained 8-hour battery powered lights. Emergency lighting in the control room is provided by 125 VDC emergency lighting distribution switchboard NK051A. The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
RP	Miscellaneous Control Panels	R, M, H, P, S	PFSSD functions associated with RP211 are affected by a fire in area A-1. Redundant capability exists in a separate area and is unaffected by a fire in area A-1.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.

Table A-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-1

System	System Name	PFSSD Function*	Comments
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-1.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-1. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are generally described in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Isolation of Letdown

A fire in area A-1 could prevent valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B, and BGHV8149C from being closed using their associated control room hand switches. If this occurs, the valves can be closed by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer level indication is available using BBLI0459A and BBLI0460A.

3.2.2 Normal Pressurizer Spray

Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, the spray can be stopped by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer pressure indication is available using BBPI0455A, BBPI0456, BBPI0457 or BBPI0458.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR

If valve BBPV8702A fails to respond when initiating RHR for cold shutdown, make a containment entry to manually open the valve or perform a cold shutdown repair to fix the damaged circuit.

4.0 CONCLUSION

With some exceptions, redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-1.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-1

PFSSD components (S. in E-15000) located in fire area A-1 are shown in Table A-1-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-1-3.

Table A-1-3
PFSSD Equipment Located in Fire Area A-1

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1101	RP211	Auxiliary Relay Rack	5.1.1	
1101	NG100B	CVCS Heat Trace Isolation Fuses	5.1.7	
1101	QJS0001	CVCS Heat Trace Power Transfer Switch	5.1.7	
1115	BG8402B	Charging pump discharge to the regenerative heat exchanger (Manual Valve)	5.1.2	
1115	BGV0017	Charging pump discharge to the regenerative heat exchanger bypass valve (Manual Valve)	5.1.2	
1202	BBPT403	Wide range reactor coolant pressure transmitter	5.1.5	
1202	BBPT406	Wide range reactor coolant pressure transmitter	5.1.5	
1202	BGFT0215A	Reactor coolant pump seal total flow transmitter	5.1.3	
1202	BGFT0215B	Reactor coolant pump seal total flow transmitter	5.1.3	
1203	EJHV8811B	Containment Recirc. Sump to RHR Pump B isolation valve	5.1.6	
1203	EJZS8811B	Position switch on Containment Recirc. Sump to RHR Pump B isolation valve	5.1.6	
1203	TB12403	RWST to RHR B Suction Valve Control Circuit Terminal Box	5.2.3	
1204	EJHV8811A	Containment Recirc. Sump to RHR Pump A isolation valve	5.1.4	
1204	EJZS8811A	Position switch on Containment Recirc. Sump to RHR Pump A isolation valve	5.1.4	

5.1.1 Auxiliary Relay Rack RP211

RP211 is an auxiliary relay rack located in room 1101. Power to this panel is supplied by the PK5129 distribution panel through cable 15RPK09EA. Loss of power to the relay panel will result in loss of power to relay 3XBM46, which will prevent closing the blowdown isolation valves.

Calculation XX-E-013 identifies relay 3XBM46 as the only PFSSD related relay located in this enclosure. The function of this relay is to close valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004 if a blowdown and sample process isolation signal is received. Under normal conditions the relay is de-energized, the auxiliary contacts are closed, and valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004 are open.

The PFSSD position of BMHV0001, BMHV0002, BMHV0003, and BMHV0004 is closed. Cables associated with relay 3XBM46 for all four valves run through room 1101. These cables are identified in Table A-1-4.

Table A-1-4
Cables Associated With Relay 3XBM46 in Fire Area A-1

BMHV0001	BMHV0002	BMHV0003	BMHV0004
15BMK06AA	15BMK06BA	15BMK06CA	15BMK06DA
15BMK06AB	15BMK06BB	15BMK06CB	15BMK06DB
15BMK06AC	15BMK06BC	15BMK06CC	15BMK06DC

A fire in area A-1 will damage the above listed cables, resulting in loss of valve position indication on the BM157 panel (room 7209) and loss of the ability to close BMHV0001, BMHV0002, BMHV0003, and BMHV0004 from the Steam Generator Blowdown Control Panel (BM157) in the Radwaste Control Room (Room 7209). Redundant circuits associated with valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004 are located in fire area A-16 and are unaffected by a fire in area A-1. These redundant circuits allow control of valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004 from the Main Control Room. In addition, valve position indication on the RL024 panel in the Main Control Room is unaffected by a fire in area A-1.

Damage to Auxiliary Relay Rack RP211, relay 3XBM46 and associated cables will not prevent achieving and maintaining safe shutdown following a fire in area A-1.

References: E-15000, XX-E-013, E-13BM04, E-13BM06A, E-13BM06C, E-13BM06D, E-93-00028, E-1F9101, M-12BM01, M-12BM02.

5.1.2 Charging Pump Discharge to Regenerative Heat Exchanger Isolation Valves

Valves BG8402B and BGV0017 are manual isolation valves located in room 1115 on the charging pump discharge to the regenerative heat exchanger. The PFSSD position of these valves is closed to direct charging flow (boration flow) through the RCP seals. The valve is used as a redundant means of isolating the regenerative heat exchanger flow path in the event that either BGHV8105 or BGHV8106 are unable to be closed from the control room.

Cables for BGHV8105 (Scheme 4BGG11A) are unaffected by a fire in area A-1. Therefore, BGHV8105 can be closed from the control room in the event of a fire in area A-1. Damage to valve BG8402B and BGV0017, or the inability to access these valves during a fire in area A-1 will not impact the ability to achieve and maintain PFSSD.

References: E-15000, XX-E-013, E-13BG11A, E-1F9102, M-12BG01, M-12BG03.

5.1.3 Centrifugal Charging Pump (CCP) Flow to RCP Seals

Seal injection, using either BGHV8357A (for seal injection using PBG05A) or BGHV8357B (for seal injection using PBG05B), is included in the PFSSD methodology for a fire outside the control room. The PFSSD methodology also requires that either BGHV8110 (if using the BGHV8357A flow path) or BGHV8111 (if using the BGHV8357B flow path) be open. Power, control and indication cables for both sets of redundant valves run through fire area A-1. These cables are listed in Table A-1-5.

Table A-1-5
Cables Associated With BGHV8110, BGHV8111, BGHV8357A and BGHV8357B in Fire Area A-1

BGHV8110	BGHV8111	BGHV8357A	BGHV8357B
11BGG11CA	14BGG11DA	11BGG52AA	14BGG52BA
11BGG11CB	14BGG11DB	11BGG52AB	14BGG52BB

Change Package 011038 installed 1-hour fire wrap around raceways carrying cables for Train A CCP valves BGHV8357A and BGHV8110, as shown in Table A-1-6. In addition, automatic fire suppression and detection is installed in the area. This configuration meets the Wolf Creek commitment to 10CFR50, Appendix R section III.G.2.c for protection of one redundant train of equipment. Therefore, a fire in area A-1 will not impact the ability to open valves BGHV8110 and BGHV8357A from the control room and provide seal injection using CCP PBG05A.

Table A-1-6
1-Hour Protected Raceways Associated With BGHV8110 and BGHV8357A in Fire Area A-1

BGHV8110		BGHV8357A	
CABLE	**RACEWAY(S)**	**CABLE**	**RACEWAY(S)**
11BGG11CA	111U1J3A, 111UJ002	11BGG52AA	111U1318, 111U1J9U, 111UJ062
11BGG11CB	111U1J3B, 111UJ002	11BGG52AB	111U1363, 111U1J3R, 111UJ062

Flow transmitters BGFT0215A and BGFT0215B measure the total seal injection flow. These flow transmitters are included in the PFSSD design to evaluate loss of charging flow to the RCP seals. A fire in area A-1 could damage the flow transmitters and associated cables, preventing diagnosis of a loss of seal injection in the event the operating charging pump is lost. RCP seal cooling remains available using thermal barrier cooling provided by the CCW system. Both trains of CCW are unaffected by a fire in this area and the thermal barrier flow path valves will remain in their normally open position. Loss of charging would be indicated by a drop in pressurizer level measured by BBLI0459A or BBLI0460A.

Based on the above discussion, RCP seal injection is available but could be momentarily lost until Train A CCP is lined up. Thermal barrier cooling remains available.

References: E-15000, XX-E-013, E-13BG11B, E-13BG51, E-13BG52, E-1F9102, M-12BG03

5.1.4 Containment Recirculation Sump to RHR Pump A Isolation Valve

EJHV8811A is the Containment Recirculation Sump to RHR Pump A isolation valve. The valve is required to be closed during hot standby and cold shutdown to prevent draining the RCS and the RWST to the containment sump. EJZS8811A is a position switch that provides an interlock to valve EJHV8701A (RCS to RHR Pump Suction). The interlock prevents the simultaneous opening of EJHV8811A and EJHV8701A.

Cables that run through area A-1 associated with the above equipment are listed in Table A-1-7.

Table A-1-7
Cables Associated With EJHV8811A and EJZS8811A in Fire Area A-1

EJHV8811A		EJZS8811A	
CABLE	**DESCRIPTION**	**CABLE**	**DESCRIPTION**
11EJG06AA	Valve EJHV8811A power	11EJG05AK	EJZS8811A to MCC
11EJG06AB	Valve EJHV8811A control	11EJG05AH	EJZS8811A to MCC
11EJG06AU	BNHV8812A interlock circuit		
11EJG06AJ	Valve EJHV8811A power		
11EJG06AK	Valve EJHV8811A control		

Cable 11EJG06AU is a 2-conductor cable connected to the position switch on BNHV8812A (RWST to RHR Pump A Suction). The position switch is in the open circuit on EJHV8811A. With BNHV8812A in the open position, the position switch contacts are open, thereby preventing EJHV8811A from opening. A short circuit in this cable will provide a permissive for valve EJHV8811A to open. However, the valve will not open because ARA contacts installed on both sides of the position switch contact will prevent the valve from opening. Therefore, damage to cable 11EJG06AU will not cause valve EJHV8811A to spuriously open.

Cables 11EJG06AA and 11EJG06AJ are 3-phase power cables that provide AC power to the motor operator for valve EJHV8811A and are run in Room 1204. This valve is not considered a High/Low pressure interface. Therefore, consideration of a 3-phase cable-to-cable hot short that could spuriously open the valve is not postulated per the assumption in calculation XX-E-013. Consequently, damage to the cables will not cause valve EJHV8811A to spuriously open.

Cables 11EJG06AB and 11EJG06AK are control cables for valve EJHV8811A and are routed in fire area A-1 (Room 1204). Spurious signals on these cables will not cause valve EJHV8811A to open but could cause a loss of valve position indication in the control room. Loss of indication will not impact the ability to achieve and maintain PFSSD since the valve is unaffected by a fire in A-1.

Cables 11EJG05AH and 11EJG05AK could be affected by a fire in area A-1 (Room 1204). A fire-induced short across the conductors in each cable will provide the permissive for valve EJHV8701A to open. If this occurs, hand switch EJHIS8701A will prevent valve EJHV8701A from spuriously opening because the circuit for hand switch EJHIS8701A is unaffected by a fire in area A-1.

Based on the above discussion, there is reasonable assurance that valve EJHV8811A will not spuriously open if a fire occurs in this area. Therefore, the RWST will not drain to the containment sump via the Train A flowpath.

References: E-15000, XX-E-013, E-13BB12A, E-13BN03, E-13EJ05A, E-13EJ06A, E-1F9102, E-1F9205, M-12BB01, M-12BN01, M-12EJ01

5.1.5 Reactor Coolant System (RCS) Pressure Indication

The PFSSD design requires RCS pressure indication to be available. RCS pressure indication is provided in the control room using BBPI0405 or BBPI0406 on RL022.

Pressure transmitter BBPT0403 is a wide range reactor coolant pressure transmitter located in room 1202. Cable 12BBI15NA associated with BBPT0403 is run through area A-1. This transmitter is used in the cold shutdown mode for PFSSD. The transmitter provides RCS pressure indication to the BBPV8702A(B) valve interlocks. On High-1 RCS pressure signal, valves BBPV8702A(B) cannot be opened. The cold shutdown PFSSD mode requires that one train of RHR be operable. A spurious signal due to a fire in area A-1 could cause a false High-1 pressure indication on BBPT403 and the inability to open valves BBPV8702A(B) from the control room.

During cold shutdown following a fire, repairs are allowed, per 10CFR50 Appendix R section III.G.1.b, as long as the repair can be made within 72 hours. If a spurious signal from BBPT403 causes valves BBPV8702A(B) to remain closed, a cold shutdown repair can be made by installing a jumper across terminals 1 and 2 on TB715 in SB032D or across terminals 3 and 21 on NG02BCF2. Alternatively, a containment entry could be made to manually operate the required valve.

BBPT0406 is a wide range reactor coolant pressure transmitter located in room 1202. This transmitter is used in the hot shutdown mode for PFSSD to provide RCS pressure indication in the Control Room. The cable associated with BBPT0406 located in area A-1 is 14BBI16BA. A fire in area A-1 could cause BBPT0406 to malfunction. The redundant PFSSD transmitter, BBPT0405, is located in room 1320 (Fire Area A-8) and is unaffected by a fire in area A-1. RCS pressure indication will, therefore, be available using BBPI0405.

References: E-15000, XX-E-013, E-13BB12A, E-13BB12B, E-13BB15, E-13BB16, E-1F9205, E-1F9201, M-12BB01, M-12BB04, M-761-00043, M-761-00101, M-767-00186.

5.1.6 Containment Recirculation Sump to RHR Pump B Isolation Valve

EJHV8811B is the Containment Recirculation Sump to RHR Pump B isolation valve. The valve is required to be closed during hot standby and cold shutdown to prevent draining the RCS and the RWST to the containment sump. EJZS8811B is a position switch that provides an interlock to valve EJHV8701B (RCS to RHR Pump Suction). The interlock prevents the simultaneous opening of EJHV8811B and EJHV8701B.

Cables that run through area A-1 associated with the above equipment are listed in Table A-1-8.

Table A-1-8 Cables Associated With EJHV8811B and EJZS8811B in Fire Area A-1			
EJHV8811B		**EJZS8811B**	
CABLE	**DESCRIPTION**	**CABLE**	**DESCRIPTION**
14EJG06BA	Valve EJHV8811B power	11EJG05BK	EJZS8811B to MCC
14EJG06BB	Valve EJHV8811B control		
14EJG06BF	BNHV8812B Interlock Circuit		
14EJG06BJ	Valve EJHV8811B power		
14EJG06BK	Valve EJHV8811B control		

Cable 14EJG06BF is a 2-conductor cable connected to the position switch on BNHV8812B (RWST to RHR Pump B Suction). The position switch is in the open circuit on EJHV8811B. With BNHV8812B in the open position, the position switch contacts are open, thereby preventing EJHV8811B from opening. A fire in area A-1 could cause a short across the contacts, which would provide the permissive for valve EJHV8811B to open. However, the valve will not open because ARA contacts installed on both sides of the position switch contact will prevent the valve from opening. Therefore, damage to cable 14EJG06BF will not cause valve EJHV8811B to spuriously open.

Cables 14EJG06BA and 14EJG06BJ are 3-phase power cables (3/C #6 AWG) that provide AC power to the motor operator for valve EJHV8811B and are routed in fire area A-1 (Room 1203). Valve EJHV8811B is not considered a High/Low pressure interface. Therefore, consideration of a 3-phase cable-to-cable hot short that could spuriously open the valve is not postulated per the assumption in calculation XX-E-013. Consequently, damage to the cables will not cause valve EJHV8811B to spuriously open.

Cables 14EJG06BB and 14EJG06BK are control cables (7/C #14 AWG) for valve EJHV8811B and are routed in fire area A-1 (Room 1203). Spurious signals on these cables will not cause valve EJHV8811B to open but could cause valve position indication to be lost. Loss of indication will not impact the ability to achieve and maintain PFSSD since the valve is unaffected by a fire in A-1.

Cable 11EJG05BK could be affected by a fire in A-1. A fire-induced short across the conductors will provide the permissive for valve EJHV8701B to open even though valve EJHV8811B may be open. If this occurs, valve EJHV8701B will not spuriously open because the circuit for hand switch EJHIS8701B is unaffected by a fire in area A-1 and would ensure valve EJHV8701B remains closed.

Based on the above discussion, there is reasonable assurance that valve EJHV8811B will not spuriously open if a fire occurs in this area. Therefore, the RWST will not drain to the containment sump via the Train B flowpath.

References: E-15000, XX-E-013, E-13BB12B, E-13BN03A, E-13EJ05B, E-13EJ06B, E-1F9102, E-1F9205, M-12BB01, M-12BN01, M-12EJ01

5.1.7 CVCS Heat Tracing

Heat tracing has been installed to maintain the emergency borate line and other fluid lines above the solidification temperature in the Train A SI pump room. Both safety trains can power the heat tracing; an automatic transfer switch (QJS0001) switches from Train A (primary source) to Train B (alternate source) on loss of A Train.

Fire area A-1 contains cables and components associated with the CVCS heat tracing system. Components of the heat tracing system located in this area are QJS0001 and NG100B. Cables 14NGY13BA, 16QJY07KB and 16QJY07KC are also located in this area.

Per Calculation XX-E-013, the emergency borate line and heat tracing is credited for long term boration after a control room fire. The heat tracing system is not credited for PFSSD where the fire is outside the control room. Although a fire in area A-1 could affect operation of the heat tracing system, the system is not required for a fire in area A-1. Loss of these components and cables will not adversely impact PFSSD. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-13NG13, E-13QJ07, DCP 13130

5.2 PFSSD CABLE EVALUATION

Table A-1-9 lists all the PFSSD cables (S. in E-15000) located in fire area A-1. The applicable evaluation section is also listed in Table A-1-9.

Table A-1-9
PFSSD Cables Located in Fire Area A-1

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ALB01AA	1128	DPAL01A	P	5.2.1	Auxiliary Feedwater Pump A Motor
11ALY09CE	1122	ALHV0009	P	5.2.1	MDAFP A to SG B Control Valve
11ALY09DE	1122	ALHV0011	P	5.2.1	MDAFP A to SG C Control Valve
11BGG11CA	1101	BGHV8110	P	5.1.3	CCP A Mini-Flow Valve
11BGG11CB	1101	BGHV8110	C	5.1.3	CCP A Mini-Flow Valve
11BGG12AD	1101	BGLCV0112B	C	5.2.2	BNLCV0112D Interlock
11BGG52AA	1101	BGHV8357A	P	5.1.3	CCP A Discharge to RCP Seals
11BGG52AB	1101	BGHV8357A	C	5.1.3	CCP A Discharge to RCP Seals
11BGI51AA	1202, 1203	BGFT0215A	I	5.1.3	RCP Seal Injection Total Flow Transmitter
11BNG01AA	1101	BNLCV0112D	P	5.2.2	RWST to CCP A Suction Valve
11BNG01AB	1101	BNLCV0112D	C	5.2.2	RWST to CCP A Suction Valve
11BNG03AA	1101	BNHV8812A	P	5.2.3	RWST to RHR A Suction Valve
11BNG03AB	1101	BNHV8812A	C	5.2.3	RWST to RHR A Suction Valve
11BNG03AE	1204	BNHV8812A	C	5.2.3	RWST to RHR A Suction Valve
11EJG05AG	1101	EJHV8701A	C	5.2.4	BNHV8812A Interlock
11EJG05AH	1204	EJHV8701A	C	5.1.4	EJHV8811A Interlock
11EJG05AK	1204	EJHV8701A	C	5.1.4	EJHV8811A Interlock
11EJG05BF	1101	EJHV8701B	C	5.2.5	EJHV8804B Interlock
11EJG05BG	1101	EJHV8701B	C	5.2.5	BNHV8812B Interlock
11EJG05BK	1203, 1204	EJHV8701B	C	5.1.6	EJHV8811B Interlock
11EJG06AA	1204	EJHV8811A	P	5.1.4	Containment Sump Isolation Valve
11EJG06AB	1204	EJHV8811A	C	5.1.4	Containment Sump Isolation Valve

Table A-1-9
PFSSD Cables Located in Fire Area A-1

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EJG06AJ	1204	EJHV8811A	P	5.1.4	Containment Sump Isolation Valve
11EJG06AK	1204	EJHV8811A	C	5.1.4	Containment Sump Isolation Valve
11EJG06AU	1122	EJHV8811A	C	5.1.4	BNHV8812A Interlock
11EJG08AB	1101	EJFCV0610	C	5.2.6	RHR A Mini Flow Valve
11EJG08AE	1101	EJFCV0610	P	5.2.6	RHR A Mini Flow Valve
11EMG02AA	1122	EMHV8803A	P	5.2.7	Charging Pump A to BIT Inlet Isolation Valve
11EMG02AB	1122	EMHV8803A	C	5.2.7	Charging Pump A to BIT Inlet Isolation Valve
11GLG05AA	1101	DSGL10A	P	5.2.8	RHR A Pump Room Cooler
11GLG05GA	1101	DSGL12A	P	5.2.8	CCP A Pump Room Cooler
12BBI15NA	1202	BBPT0403	I	5.1.5	RCS Hot Leg Wide Range Pressure
14ALB01BA	1128	DPAL01B	P	5.2.1	Auxiliary Feedwater Pump B Motor
14BBG12AD	1101	BBPV8702A	C	5.2.4	BNHV8812A Interlock
14BBG12AE	1203, 1204	BBPV8702A	C	5.2.4	EJHV8811A Interlock
14BBG12BC	1101	BBPV8702B	C	5.2.5	EJHV8804B Interlock
14BBG12BD	1101	BBPV8702B	C	5.2.5	BNHV8812B Interlock
14BBG12BE	1203	BBPV8702B	C	5.2.5	EJHV8811B Interlock
14BBG12BK	1203	BBPV8702B	C	5.2.5	EJHV8811B Interlock
14BBI16BA	1120, 1202, 1203A	BBPT0406	I	5.1.5	RCS Hot Leg Wide Range Pressure
14BGG11DA	1101	BGHV8111	P	5.1.3	CCP B Mini-Flow Valve
14BGG11DB	1101	BGHV8111	C	5.1.3	CCP B Mini-Flow Valve
14BGG12BD	1101	BGLCV112C	C	5.2.2	BNLCV112E Interlock

Table A-1-9
PFSSD Cables Located in Fire Area A-1

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BGG52BA	1101	BGHV8357B	P	5.1.3	CCP B Discharge to RCP Seals
14BGG52BB	1101	BGHV8357B	C	5.1.3	CCP B Discharge to RCP Seals
14BGI51BA	1120, 1202, 1203A	BGFT0215B	I	5.1.3	RCP Seal Injection Total Flow Transmitter
14BNG01BA	1101	BNLCV112E	P	5.2.2	RWST to CCP B Suction Valve
14BNG01BB	1101	BNLCV112E	C	5.2.2	RWST to CCP B Suction Valve
14BNG03BA	1101	BNHV8812B	P	5.2.3	RWST to RHR B Suction Valve
14BNG03BB	1101	BNHV8812B	C	5.2.3	RWST to RHR B Suction Valve
14BNG03BK	1203	BNHV8812B	C	5.2.3	RWST to RHR B Suction Valve
14BNG03BL	1203	BNHV8812B	C	5.2.3	RWST to RHR B Suction Valve
14EJG04BA	1101	EJHV8804B	P	5.2.9	RHR Pump B to SI Pump B Isolation Valve
14EJG04BB	1101	EJHV8804B	C	5.2.9	RHR Pump B to SI Pump B Isolation Valve
14EJG06BA	1203	EJHV8811B	P	5.1.6	Containment Sump Isolation Valve
14EJG06BB	1203	EJHV8811B	C	5.1.6	Containment Sump Isolation Valve
14EJG06BF	1101	EJHV8811B	C	5.1.6	BNHV8812B Interlock
14EJG06BJ	1203	EJHV8811B	P	5.1.6	Containment Sump Isolation Valve
14EJG06BK	1203	EJHV8811B	C	5.1.6	Containment Sump Isolation Valve
14EJG08BB	1101	EJFCV0611	C	5.2.6	RHR B Mini Flow Valve
14EJG08BE	1101	EJFCV0611	P	5.2.6	RHR B Mini Flow Valve
14EJG08BF	1101	EJFIS0611	C	5.2.6	RHR B Mini Flow Indicating Switch
14GLG05BA	1101	DSGL10B	P	5.2.8	RHR B Pump Room Cooler
14GLG05HA	1101	DSGL12B	P	5.2.8	CCP B Pump Room Cooler

Table A-1-9
PFSSD Cables Located in Fire Area A-1

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NGY13BA	1101	NG100B	P	5.1.7	CVCS Heat Tracing Isolation Fuses
15BBA01AC	1101, 1122, 1130	DPBB01A	C	5.2.13	Reactor Coolant Pump A Motor
15BBA01AE	1122	DPBB01A	C	5.2.13	Reactor Coolant Pump A Motor
15BBA01BC	1101, 1122, 1130	DPBB01B	C	5.2.13	Reactor Coolant Pump B Motor
15BBA01BE	1122	DPBB01B	C	5.2.13	Reactor Coolant Pump B Motor
15BBI19AA	1101, 1122, 1130	BBPCV0455B	I	5.2.14	Pressurizer Spray Valve
15BBI19BA	1101, 1122, 1130	BBPCV0455C	I	5.2.14	Pressurizer Spray Valve
15BGK10AA	1101, 1122, 1130	BGLCV0459	P, C	5.2.10	Letdown Isolation Valve
15BGK10AD	1101, 1122, 1130	BGLCV0459	P, C	5.2.10	Letdown Isolation Valve
15BGK10BA	1101, 1122, 1130	BGLCV0460	P, C	5.2.10	Letdown Isolation Valve
15BGK10BD	1101, 1122, 1130	BGLCV0460	P, C	5.2.10	Letdown Isolation Valve
15BGK35AB	1101, 1122, 1130	BGHV8149A	C	5.2.10	Letdown Orifice Isolation Valve
15BGK35AD	1101, 1122, 1130	BGHV8149A	C	5.2.10	Letdown Orifice Isolation Valve
15BGK35BB	1101, 1122, 1130	BGHV8149B	C	5.2.10	Letdown Orifice Isolation Valve
15BGK35BD	1101, 1122, 1130	BGHV8149B	C	5.2.10	Letdown Orifice Isolation Valve
15BGK35CB	1101, 1122, 1130	BGHV8149C	C	5.2.10	Letdown Orifice Isolation Valve
15BGK35CD	1101, 1122, 1130	BGHV8149C	C	5.2.10	Letdown Orifice Isolation Valve
15BMK06AA	1101, 1102, 1122, 1128, 1129, 1130	BMHV0001	C	5.1.1	SG A to Blowdown Flash Tank Isolation Valve
15BMK06AB	1101, 1102	BMHV0001	C	5.1.1	SG A to Blowdown Flash Tank Isolation Valve
15BMK06AC	1101, 1102, 1122, 1130	BMHV0001	C	5.1.1	SG A to Blowdown Flash Tank Isolation Valve

Table A-1-9
PFSSD Cables Located in Fire Area A-1

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15BMK06BA	1101, 1102, 1122, 1128, 1129, 1130	BMHV0002	C	5.1.1	SG B to Blowdown Flash Tank Isolation Valve
15BMK06BB	1101, 1102	BMHV0002	C	5.1.1	SG B to Blowdown Flash Tank Isolation Valve
15BMK06BC	1101, 1102, 1122, 1130	BMHV0002	C	5.1.1	SG B to Blowdown Flash Tank Isolation Valve
15BMK06CA	1101, 1102, 1122, 1128, 1129, 1130	BMHV0003	C	5.1.1	SG C to Blowdown Flash Tank Isolation Valve
15BMK06CB	1101, 1102	BMHV0003	C	5.1.1	SG C to Blowdown Flash Tank Isolation Valve
15BMK06CC	1101, 1102, 1122, 1130	BMHV0003	C	5.1.1	SG C to Blowdown Flash Tank Isolation Valve
15BMK06DA	1101, 1102, 1122, 1128, 1129, 1130	BMHV0004	C	5.1.1	SG D to Blowdown Flash Tank Isolation Valve
15BMK06DB	1101, 1102	BMHV0004	C	5.1.1	SG D to Blowdown Flash Tank Isolation Valve
15BMK06DC	1101, 1102, 1122, 1130	BMHV0004	C	5.1.1	SG D to Blowdown Flash Tank Isolation Valve
15BMK16AA	1101, 1102	BM157	P	5.2.11	Steam Generator Blowdown Control Panel
15EMK05EA	1101, 1122, 1130	EMHV8882	C	5.2.7	Boron Injection Downstream Test Line
15PGA10BA	1101, 1102	PA0106	C	5.2.15	Load Centers PG15, PG17 and PG19 Fdr Bkr
15RPK09EA	1101	RP211	P	5.1.1	Auxiliary Relay Rack
16BBA01CC	1101, 1102, 1120	DPBB01C	C	5.2.13	Reactor Coolant Pump C Motor
16BBA01CE	1120	DPBB01C	C	5.2.13	Reactor Coolant Pump C Motor
16BBA01DC	1101, 1102, 1120	DPBB01D	C	5.2.13	Reactor Coolant Pump D Motor
16BBA01DE	1120	DPBB01D	C	5.2.13	Reactor Coolant Pump D Motor
16PGA11AC	1101, 1102	PA0207	C	5.2.15	Load Centers PG14, PG18, PG20 and PG24 Fdr Bkr

Table A-1-9
PFSSD Cables Located in Fire Area A-1

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16PKG11BA	1101	PK22	P	5.2.12	125VDC Non-Class 1E Battery Charger
16PKG13AA	1101	PK04	P	5.2.16	125VDC Non-Class 1E Battery Charger
16QJY07KB	1101	QJS0001	P	5.1.7	CVCS Heat Tracing Transfer Switch Secondary Feed
16QJY07KC	1101	QJTS6251	P	5.1.7	CVCS Heat Tracing Power Feed

5.2.1 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire AFW demand to achieve cold shutdown.

Motor operated valves (MOVs) in the system allow operators to line up the auxiliary feedwater system as required to achieve and maintain safe shutdown. Damage to the MOV circuits due to a fire could prevent operators from lining up the system from the control room.

Cable 11ALB01AA is the power cable for the Train A MDAFP. Cable 14ALB01BA is the power cable for the Train B MDAFP. Damage these cables due to a fire in this area will prevent operation of MDAFPs PAL01A and PAL01B.

Cable 11ALY09CE is a power cable associated with the Modutronic controller on valve ALHV0009 (Train A MDAFP to Steam Generator B). Damage to this cable could disable power to the controller and prevent flow control from the Train A MDAFP to SG B. As stated above, the Train A MDAFP may not be available, therefore valve ALHV0009 is not required if a fire occurs in this area.

Cable 11ALY09DE is a power cable associated with the Modutronic controller on valve ALHV0011 (Train A MDAFP to Steam Generator C). Damage to this cable could disable power to the controller and prevent flow control from the Train A MDAFP to SG C. As stated above, the Train A MDAFP may not be available, therefore valve ALHV0011 is not required if a fire occurs in this area.

Cables associated with the turbine driven auxiliary feedwater pump (TDAFP) are located in a separate fire area and are unaffected by a fire in area A-1. The TDAFP is redundant to both motor driven auxiliary feedwater pumps and is unaffected by a fire in area A-1. Therefore, the TDAFWP is available to provide feedwater to the steam generators in the event of a fire in A-1.

Based on the above discussion, both motor driven auxiliary feedwater pumps may be unavailable if a fire occurs in this area but the turbine driven auxiliary feedwater pump is unaffected and is available to supply all four steam generators.

References: E-15000, XX-E-013, E-13AL01A, E-13AL01B, E-13AL09, E-13NB01, E-13NB04

5.2.2 VCT and RWST to Charging Pump Suction Valves

The reactivity control and makeup functions of PFSSD require charging pumps taking suction from the RWST and isolation of at least one of the VCT outlet valves. A fire in area A-1 uses CCP A, so RWST to CCP A suction valve BNLCV0112D is required to be open and either VCT outlet valve BGLCV0112B or BGLCV0112C is required to be closed.

Cable 11BGG12AD is the close permissive interlock circuit that closes the Volume Control Tank (VCT) to Charging Pump suction valve (BGLCV0112B) when the RWST to CCP A valve (BNLCV0112D) is fully open.

Cable 11BNG01AA is the power cable for BNLCV0112D. Cable 11BNG01AB is a control cable for BNLCV0112D. Damage to either of these cables will prevent opening BNLCV0112D.

Change Package 011038 installed 1-hour fire wrap around raceways carrying cables for BGLCV0112B and BNLCV0112D as shown in Table A-1-10.

Table A-1-10
1-Hour Protected Raceways Associated With BGLCV0112B and BNLVC112D in Fire Area A-1

BGLCV0112B		BNLCV0112D	
CABLE	**RACEWAY(S)**	**CABLE**	**RACEWAY(S)**
11BGG12AD	111U1J3B, 111UJ002	11BNG01AA	111U1J3A, 111UJ002
		11BNG01AB	111U1J3B, 111UJ002

In addition, automatic fire suppression and detection is installed in the area. This configuration meets the Wolf Creek commitment to 10CFR50, Appendix R section III.G.2.c for protection of one redundant train of equipment. Therefore, a fire in area A-1 will not impact the ability for valve BGLCV0112B to automatically close on Low VCT level and will not prevent opening valve BNLCV0112D from the control room.

Cable 14BGG12BD is the close permissive interlock circuit that closes the Volume Control Tank (VCT) to Charging Pump suction valve (BGLCV0112C) when the RWST to CCP B valve (BNLCV0112E) is fully open. Cable 14BNG01BA is the power cable for BNLCV0112E. Cable 14BNG01BB is a control cable for BNLCV112E. Damage to either of these cables will prevent the opening of BNLCV0112E. However, as stated above, CCP B is not used for a fire in area A-1 so valve BNLCV0112E is not required to be open.

A fire in area A-1 will not prevent a suction source from the RWST to CCP A from being achieved. A fire in area A-1 will also not prevent isolating the VCT to CCP suction flow path.

References: E-15000, XX-E-013, DCP 011038, E-13BG12, E-13BN01

5.2.3 Refueling Water Storage Tank (RWST) and Containment Sump Isolation Valves

Cable 11BNG03AA is the power cable for the BNHV8812A valve motor. Cable 11BNG03AB is a control cable for the BNHV8812A valve. The PFSSD lineup requires that either BNHV8812A or EJHV8811A be shut to prevent draining down the RWST to the containment sump.

As discussed in Section 5.1.4 above, a fire in area A-1 will not cause valve EJHV8811A to spuriously open. In addition, Change Package 011038 installed 1-hour fire wrap around raceways carrying cables for BNHV8812A as shown in Table A-1-11.

Table A-1-11
1-Hour Protected Raceways Associated With BNHV8812A in Fire Area A-1

CABLE	RACEWAY(S)
11BNG03AA	111U1F2B, 111UJ001
11BNG03AB	111U1F2A, 111UJ001

In addition, automatic fire suppression and detection is installed in the area. This configuration meets the Wolf Creek commitment to 10CFR50, Appendix R section III.G.2.c for protection of

one redundant train of equipment. Therefore, a fire in area A-1 will not impact the ability to close valve BNHV8812A from the control room.

Cable 11BNG03AE is a control cable for valve BNHV8812A. An open circuit involving this cable could prevent automatic closure of valve BNHV8812A if valve EJHV8811A opens, causing the RWST to drain to the containment sump. A short to ground involving this cable could prevent operation of the valve from the control room. As stated previously, EJHV8811A will not spuriously open if a fire occurs in this area, so damage to this cable will have no adverse impact on PFSSD.

Cable 14BNG03BA is the power cable for the BNHV8812B valve motor. Cables 14BNG03BB, 14BNG03BK and 14BNG03BL are control cables for the BNHV8812B valve. Terminal box TB12402 is the connection for control cables 14BNG03BK and 14BNG03BL. The PFSSD lineup requires that either BNHV8812B or EJHV8811B be shut to prevent draining down the RWST to the containment sump. Damage to these cables could prevent closing BNHV8812B. As discussed in Section 5.1.6, valve EJHV8811B will not spuriously open if a fire occurs in this area.

Based on the above discussion, draindown of the RWST to the containment sump will not occur due to a fire in area A-1.

References: E-15000, XX-E-013, DCP 011038, E-13BN03

5.2.4 RHR Loop 1 Inlet Isolation Valves

Either RHR Loop 1 inlet isolation valve BBPV8702A or EJHV8701A is required to be closed during hot standby. Both valves BBPV8702A and EJHV8701A are required to be open when operating RHR Pump A for cold shutdown. A fire in area A-1 uses RHR pump A for cold shutdown.

Cable 11EJG05AG is the open permissive circuit that allows EJHV8701A to open only when RWST to RHR suction valve BNHV8812A is closed.

Change Package 011038 installed 1-hour fire wrap around raceways 111U1F2A and 111UJ001 which carry cable 11EJG05AG for EJHV8701A in area A-1. In addition, automatic fire suppression and detection is installed in the area. This configuration meets the Wolf Creek commitment to 10CFR50, Appendix R section III.G.2.c for protection of one redundant train of equipment. Therefore, there is reasonable assurance that damage to cable 11EJG05AG due to a fire in area A-1 will not occur and valve EJHV8701A can be controlled from the control room.

Cable 14BBG12AD is the open permissive circuit that allows BBPV8702A to open only when BNHV8812A is closed. Cable 14BBG12AE is the open permissive circuit that allows BBPV8702A to open only when EJHV8811A is closed.

Cable 14BBG12AD is routed in fire area A-1 (Room 1101). A fire in this area could cause a hot short across conductors 22 and 32 which would provide the open permissive signal for valve BBPV8702A to open even if valve BNHV8812A is open. A fire in area A-1 (Rooms 1203 and 1204) could also cause a hot short across conductors 12 and 22 in cable 14BBG12AE which would provide the open permissive signal for valve BBPV8702A to open even if valve EJHV8811A is open. However, even though the permissives may be satisfied, hand switch BBHIS8702A located on RL017 in the main control room is unaffected by the fire and is available to ensure valve BBPV8702A remains closed.

An open circuit on either conductor in cables 14BBG12AD and 14BBG12AE will prevent opening valve BBPV8702A from the control room. Since the valve is required to be open when transitioning to cold shutdown, a cold shutdown repair can be made by installing a jumper

across terminals TB19 and TB20 in NG02BCF2 to repair an open in cable 14BBG12AD and terminals TB18 and TB19 in NG02BCF2 to repair an open in cable 14BBG12AE.

A fire in area A-1 will not impact the ability to maintain the RCS to RHR pump A flow path closed during hot standby. The fire could impact the ability to open this flow path when transitioning to RHR for cold shutdown. In this case, a cold shutdown repair can be made or a containment entry made to open the valves.

References: E-15000, XX-E-013, E-13BB12A, E-13EJ05A, DCP 011038

5.2.5 RHR Loop 2 Inlet Isolation Valves

Either RHR Loop 2 inlet isolation valve BBPV8702A or EJHV8701A is required to be closed during hot standby. Since a fire in area A-1 uses RHR pump A for cold shutdown, either valve is required to be closed during cold shutdown.

Cable 11EJG05BF is the open permissive circuit that allows RHR loop 2 inlet isolation valve EJHV8701B to open only when SI Pump inlet isolation valve EJHV8804B is closed. Cable 11EJG05BG is the open permissive circuit that allows valve EJHV8701B to open only when RWST to RHR pump B suction valve BNHV8812B is closed.

Hand switch EJHIS8701B located on RL017 in the main control room is unaffected by a fire in A-1 and is available to ensure valve EJHV8701B remains closed during hot standby and cold shutdown.

Cable 11EJG05BG is routed in area A-1 (Room 1101) in conduit 111U1F2A and junction box 111UJ001. DCP 011038 added 1-hour rated fire wrap around conduit 111U1F2A and junction box 111UJ001. This fire wrap, in combination with automatic fire suppression and detection in the area, provides reasonable assurance that the cable will not be damaged during a fire in area A-1.

Cable 14BBG12BC is the open permissive circuit that allows BBPV8702B to open only when EJHV8804B is closed. Cable 14BBG12BD is the open permissive circuit that allows BBPV8702B to open only when BNHV8812B is closed. Cables 14BBG12BE and 14BBG12BK are part of the open permissive that allows BBPV8702B to open only when EJHV8811B is closed.

If a fire causes damage to these cables that allows the permissives to be satisfied, hand switch BBHIS8702B located on RL017 in the main control room is available to ensure valve BBPV8702B remains closed. Circuits for BBHIS8702B are unaffected by a fire in area A-1.

A fire in area A-1 will not cause either valve BBPV8702B or EJHV8701B to spuriously open as long as hand switches BBHIS8702B or EJHIS8701B are in the close position.

References: E-15000, XX-E-013, DCP 011038, E-13BB12B, E-13EJ05B

5.2.6 RHR Pump Mini-Flow Valves

The RHR pump mini-flow path is required when the RHR system is operating, to prevent damage to the RHR pump during low flow in the RHR system. The RHR mini-flow path consists of the mini-flow valve, flow indicating switch, pipe and fittings. With flow at or below the desired setting, the flow indicating switch low-flow contacts close, sending an “open” signal to the mini-flow valve and thus allowing recirculating flow through the mini-flow path. When flow exceeds the desired setting, the flow indicating switch high-flow contacts close, sending a “close” signal to the mini-flow valve and thus preventing recirculating flow through the mini-flow path.

Control cables associated with the B Train mini-flow indicating switch EJFIS0611 are located in Fire Area A-1, as shown in Table A-1-9. Damage to the cable could prevent the B Train RHR mini-flow sub-system from performing its intended function.

Cable 11EJG08AB is the control cable for RHR pump A mini-flow valve EJFCV0610. Cable 11EJG08AE is the power cable for valve EJFCV0610. Valve EJFCV0610 is installed on the recirculation line of the ‘A’ RHR pump and controls recirc flow to protect the pump during low flow conditions. The valve is required to be open during RHR pump A operation (cold shutdown). The valve is not required during hot standby.

Cable 14EJG08BB is the control cable for RHR pump B mini-flow valve EJFCV0611. 14EJG08BE is the power cable for valve EJFCV0611. Valve EJFCV0611 is installed on the recirculation line of the ‘B’ RHR pump and controls recirc flow to protect the pump during low flow conditions. The valve is required to be open during RHR pump B operation (cold shutdown). The valve is not required during hot standby.

Change Package 011038 installed 1-hour fire wrap around raceways carrying cables for EJFCV0610 as shown in Table A-1-12. In addition, automatic fire suppression and detection is installed in the area. This configuration meets the Wolf Creek commitment to 10CFR50, Appendix R section III.G.2.c for protection of one redundant train of equipment. Therefore, a fire in area A-1 will not impact the ability to control valve EJFCV0610.

Table A-1-12
1-Hour Protected Raceways Associated With EJFCV0610 in Fire Area A-1

CABLE	RACEWAY(S)
11EJG08AB 11EJG08AE	111U1F2C, 111UJ001

Based on the above discussion, damage to cables and components associated with the Train B RHR system will not adversely affect PFSSD since Train A RHR is available.

References: E-15000, XX-E-013, E-13EJ08, E-13EJ08A, E-1F9205, E-1R1124, M-12EJ01, CR 25002, CP 13615, CP 11038

5.2.7 Boron Injection Tank Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

A fire in area A-1 uses CCP A since circuits for CCP B may be affected by the fire. Also, a fire in area A-1 has the possibility to cause a momentary loss of inventory through the letdown flow path until the letdown isolation valves can be failed closed. Therefore, charging through the BIT flow path may be required for hot standby. In addition, as discussed above, the BIT flowpath is required for transition to cold shutdown.

Valve EMHV8803A is a normally closed valve that controls charging flow from Train A CCP to the Boron Injection Tank (BIT). This valve is required to be open for PFSSD since a fire in area A-1 uses Train A CCP. Valve EMHV8882 is an isolation valve for the boron injection downstream test line. The PFSSD position of this valve is closed to prevent flow diversion through this flow path.

Cable 11EMG02AA is the power cable for EMHV8803A motor operator. Cable 11EMG02AB is the control cable for EMHV8803A.

Cable 15EMK05EA is a control cable for EMHV8882. A +125 VDC external cable hot short in contact with conductor 2 in cable 15EMK05EA will energize the solenoid and open valve EMHV8882. The cable is routed in raceways with cables carrying the proper voltage and polarity. The hot short would bypass the control room hand switch (EMHIS8882) on RL018 and control of this valve from the control room would be lost. Normally closed valve EMHV8871 is unaffected by a fire in area A-1 and will remain closed to prevent flow of water through the SIS test line.

Change package 011656 installed 1-hour fire wrap around raceway carrying cables for EMHV8803A as shown in Table A-1-13. In addition, automatic fire suppression and detection is installed in the area. This configuration meets the Wolf Creek commitment to 10CFR50, Appendix R section III.G.2.c for protection of one redundant train of equipment. Therefore, a fire in area A-1 will not impact EMHV8803A.

Table A-1-13
1-Hour Protected Raceways Associated With EMHV8803A in Fire Area A-1

CABLE	RACEWAY
11EMG02AA 11EMG02AB	111U3E1A

Based on the above discussion, the BIT flowpath is available for boration and inventory control.

References: E-15000, XX-E-013, E-13EM02, E-13EM05, E-1R1143B, E-1R1143C, DCP 011656

5.2.8 Centrifugal Charging Pump (CCP) and Residual Heat Removal (RHR) Pump Room Coolers

A fire in area A-1 uses CCP A for boration and makeup and RHR pump A to achieve cold shutdown. Therefore, each pumps room cooler is required to be operable to support operation of the respective pump. Cables associated with both Trains of RHR pump room coolers are run in area A-1 (Room 1101).

Cable 11GLG05AA is the power cable to the ‘A’ RHR pump room cooler (DSGL10A). Cable 11GLG05GA is the power cable to the ‘A’ CCP pump room cooler (DSGL12A).

Cable 14GLG05BA is the power cable to the ‘B’ RHR pump room cooler (DSGL10B). Cable 14GLG05HA is the power cable to the ‘B’ CCP pump room cooler (DSGL12B).

Change Package 011038 installed 1-hour fire wrap around raceways carrying cables for DSGL10A and DSGL12A as shown in Table A-1-14. In addition, automatic fire suppression and detection is installed in the area. This configuration meets the Wolf Creek commitment to 10CFR50, Appendix R section III.G.2.c for protection of one redundant train of equipment. Therefore, a fire in area A-1 will not impact DSGL10A and DSGL12A.

Table A-1-14
1-Hour Protected Raceways Associated With DSGL10A and DSGL12A in Fire Area A-1

DSGL10A		DSGL12A	
CABLE	**RACEWAY(S)**	**CABLE**	**RACEWAY(S)**
11GLG05AA	111U1F2B, 111UJ001	11GLG05GA	111U1J3A, 111UJ002

References: E-15000, XX-E-013, E-13GL05, DCP 011038

5.2.9 RHR Pump B to Safety Injection Pump Isolation Valve

Valve EJHV8804B is the RHR pump B to Safety Injection pump isolation valve. The PFSSD position of this valve is closed during RHR Train B operation. A fire in area A-1 uses RHR Train A.

Cable 14EJG04BA is the power cable for valve EJHV8804B. Cable 14EJG04BB is a control cable for valve EJHV8804B. Valve EJHV8804B is normally closed.

The only possible failure mode that would cause valve EJHV8804B to spuriously open would be a three-phase external (inter-cable) cable-to-cable hot short across the conductors in cable 14EJG04BA. However, the assumptions section in Calculation XX-E-013 states that the probability of a three-phase hot short in the proper sequence is extremely low and does not require evaluation, except in cases of high-low pressure interfaces. Valve EJHV8804B is not a high-low pressure interface.

Therefore, there is reasonable assurance that a fire in area A-1 will not cause the spurious opening of valve EJHV8804B. In the unlikely event valve EJHV8804B spuriously opens, PFSSD is assured since RHR pump A is available for a fire in area A-1.

References: E-15000, XX-E-013, E-13EJ04B

5.2.10 Letdown Isolation Valves

Valves BGLCV0459 and BGLCV0460 are isolation valves installed in series on the inlet side of the regenerative heat exchanger. PFSSD requires that either of these valves be closed. Cables 15BGK10AA and 15BGK10AD are power/control cables for the BGLCV0459 solenoid valve (BGHY0459). Air supplied by an open (energized) solenoid valve will open valve BGLCV0459. A closed (de-energized) solenoid valve will cause loss of air pressure and closure of valve BGLCV0459.

Cables 15BGK10BA and 15BGK10BD are power/control cables for the BGLCV0460 solenoid valve (BGHY0460). Air supplied by an open (energized) solenoid valve will open valve BGLCV0460. A closed (de-energized) solenoid valve will cause loss of air pressure and closure of valve BGLCV0460.

Either BGLCV0459 or BGLCV0460 must be closed or letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C must be closed. The cables for BGLCV0459 or BGLCV0460 are routed in a common enclosure in cable trays. A hot short on the cables could cause the valves to open. A hot short on 15BGK10AA and 15BGK10BA prevents closing

BGLCV0459 and BGLCV0460 from the control room. Other cables routed in the cable trays have the proper voltage for hot shorts. The hot shorts bypass MCB hand switches for BGLCV0459 and BGLCV0460. BGLCV0459 and BGLCV0460 constitute a high/low pressure interface. Therefore multiple simultaneous hot shorts must be considered.

Letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C are listed as PFSSD components because of the interlock between these valves and BGLCV0459 and BGLCV0460. The interlock prevents closure of the letdown valves when any one or more orifice isolation valves are open. Cables associated with all three letdown orifice isolation valves are located in this fire area. Damage to these cables could prevent closure of the valves from the control room. Therefore, a fire in area A-1 will prevent closure of all three letdown orifice isolation valves (BGHV8149A, BGHV8149B, and BGHV8149C) as well as the two letdown isolation valves (BGLCV0459 and BGLCV0460).

BGHV8152 is located in the low-pressure piping rated for only 600 psi pressure down stream of BGLCV0459 and BGLCV0460. Isolating BGHV8152 with the reactor pressure above 600 psi will cause relief valve BGV8117 to open to protect the pipe, and discharge the water to the PRT. A maximum of 195 gpm can be passed through the three orifice isolation valves if they are all open. The centrifugal charging pump capacity is 150-gpm. Therefore approximately 45-gpm could be potentially lost while BGLCV0459 and BGLCV0460 remain open.

Valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B, and BGHV8149C are air operated and fail in the closed position. The valves are located in containment. Instrument air to containment is controlled by valve KAFV0029, which is unaffected by a fire in area A-1. Hand switch KAHIS0029 can be used to close the valve from the control room and isolate instrument air to containment. Pressurizer level indication is available using BBLI0459A and BBLI0460A.

Based on the above discussion, letdown valves BGLCV0459 and BGLCV0460 and letdown orifice valves BGHV8149A, BGHV8149B, and BGHV8149C can be closed from the control room if a fire occurs in area A-1.

References: E-15000, XX-E-013, E-13BG10, E-13BG35, E-13KA02, M-12KA01

5.2.11 Steam Generator Blowdown Panel BM157

The PFSSD function of BM157 is to provide a redundant means to isolate blowdown isolation valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using solenoid valves BMHY0001C, BMHY0002C, BMHY0003C, and BMY0004C, respectively. This panel is located in Room 7209 in the Radwaste Control Room.

Cable 15BMK16AA is the power cable for BM157. A fire in area A-1 could cause a loss of power to BM157 which would close the blowdown isolation valves. If the blowdown isolation valves fail to close, then solenoids BMHY0001A, BMHY0002A, BMHY0003A, and BMY0004A controlled from BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A, respectively located on RL024 in the main control room are available and are unaffected by a fire in area A-1.

Therefore, damage to cable 15BMK16AA will not impact the ability to close the blowdown isolation valves.

References: E-15000, XX-E-013, E-13BM16

5.2.12 Non-Class 1E 125 VDC Battery Charger PK22

Cable 16PKG11BA is the 480 VAC power cable from NG0409 to 125 VDC battery charger PK22. Damage to this cable could result in a loss of the PK22 power feed to 125 VDC bus PK02. PK02 supplies 125 VDC power to essential PFSSD loads on the Train B system.

Redundant power feed to the PK02 bus is unaffected by a fire in area A-1. This power feed originates from 125 VDC battery group PK12, and is normally aligned to feed power to PK02 in the event PK22 is lost.

Based on the above discussion, a fire in area A-1 could result in a loss of power to PK22 but redundant power source PK02 is available and is unaffected by the fire.

References: E-15000, XX-E-013, E-11NG02, E-11PK02, E-13PK11, E-1F9422C

5.2.13 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling or spuriously open pressurizer spray is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs. Calculation WCNOC-CP-002 shows that if pressurizer spray spuriously actuates, the spray flow needs to be stopped within 50 minutes.

Two control cables associated with each reactor coolant pump are run in fire area A-1. Damage to these cables in the event of a fire could prevent operators from stopping the RCPs from the control room. However, a fire in A-1 will not cause a loss of all seal cooling. Both trains of CCW are available to provide cooling to the RCP thermal barriers and the Train A CCP is available for seal injection. As discussed in Section 5.2.14, if pressurizer spray spuriously operates, operators can stop the spray by isolating air to the valve from the control room. Therefore, tripping the RCPs is not required to mitigate spurious pressurizer spray.

Based on the above discussion, the inability to trip the RCPs from the control room will have no adverse impact on PFSSD. If pressurizer spray spuriously actuates, the valves can be closed by isolating air to the valves from the control room. In addition, seal injection is unaffected by a fire in area A-1. Therefore, the RCPs do not have to be tripped in the event of a fire in area A-1.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1, CR 25002

5.2.14 Normal Pressurizer Spray

The normal pressurizer spray valves are included in the PFSSD design because spurious operation of pressurizer sprays can cause a decrease in pressure which can lead to boiling in the core. The pressurizer spray valves are part of the pressurizer pressure control system.

The pressurizer normal spray valves (BBPCV0455B and BBPCV0455C) operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

Cable 15BBI19AA associated with pressurizer spray valve BBPCV0455B, and cable 15BBI19BA associated with pressurizer spray valve BBPCV0455C are run in this area. Damage to these cables could cause the spurious opening of the spray valves.

The pressurizer spray valves are electro/pneumatic operated and loss of air pressure will close the valves. The air supply comes from the compressed air system. Closing valve KAFV0029 using KAHIS0029 on RL024 will isolate compressed air to containment which will cause the pressurizer spray valves to close or prevent them from opening. Based on WCNOC-CP-002, spray flow needs to be stopped within 50 minutes. Since this is a control room action, this can be completed well within 50 minutes. Historical performance of STS KJ-001A, which isolates instrument air to the Reactor Building, reveals that BBPCV0455B and BBPCV0455C will fail closed in approximately 12 minutes following isolation of instrument air.

Based on the above discussion, the pressurizer spray valves could spuriously open if a fire occurs in this area. Pressurizer spray can be stopped by closing valve KAFV0029 from the main control room. Pressurizer pressure indication is available using BBPI0455A, BBPI0456, BBPI0457 or BBPI0458.

References: E-15000, XX-E-013, E-13BB19, E-13KA02, M-744-00028, WCNOC-CP-002, CR 25002, M-761A-0019 Sh. 2, DCP 013324.

5.2.15 Load Center Feeder Breakers PA0106 and PA0207

Load center feeder breakers PA0106 and PA0207 are credited for PFSSD because they supply power to credited non-safety related loads. Cables 15PGA10BA, associated with PA0106, and 16PGA11AC, associated with PA0207, run in this area. A fire induced short circuit in these cables will trip the associated breaker.

Breaker PA0106 supplies power to the following PFSSD components:

- PG19GCR217 – MCB Misc. Power Circuits RL023
- PG19GFR3 – Instr. Bus Transformer Alt. Feed XPN07D

Loss of power to these components will not adversely impact PFSSD

PFSSD components supplied power from PG19GCR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG19GFR3 is credited as one source of power to PN07. The redundant source of power from NG01BEF4 is unaffected by a fire in this area.

Based on the above discussion, loss of breaker PA0106 will not adversely affect PFSSD if a fire occurs in this area.

Breaker PA0207 supplies power to the following PFSSD components:

- PG20GBR217 – MCB Misc. Power Circuits RL023
- PG20GER5 – Instr. Bus Transformer Alt. Feed XPN08D

PFSSD components powered from PG20GBR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG20GER5 is credited as one source of power to PN08. The redundant source of power from NG02BBF1 is unaffected by a fire in this area.

Based on the above discussion, loss of breaker PA0207 will not adversely affect PFSSD if a fire occurs in this area.

Damage to cables 15PGA10BA and 16PGA11AC due to a fire in this area will not adversely impact the ability to achieve and maintain PFSSD due to the availability of redundant components that are unaffected by a fire in this area.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-11PK02, E-13PG10, E-13PG11, E-13RL07, E-13SC12, E-1F9421, E-1F9422C, KD-7496

5.2.16 Non-Class 1E 125 VDC Battery Charger PK24

Cable 16PKG13AA is the 480 VAC power cable from NG0410 to 125 VDC battery charger PK24. Damage to this cable could result in a loss of the PK24 power feed to 125 VDC bus PK04. PK04 supplies 125 VDC power to 10 kVA inverter PN04, which supplies backup 120 VAC power to RP043 and primary 120 VAC power to RP047.

Redundant power feed to the PK04 bus is unaffected by a fire in area A-1. This power feed originates from 125 VDC battery group PK14 and is normally aligned to feed power to PK04 in the event PK24 is lost.

Based on the above discussion, a fire in area A-1 could result in a loss of power to PK24 but redundant power source PK14 is available and is unaffected by the fire. In addition, redundant power to panels RP043 and RP047 is available from PN310. Therefore, 120 VAC power to panels RP043 and RP047 is available if a fire occurs in fire area A-1.

References: E-15000, XX-E-013, E-11NG02, E-11PK04, E-13PK13, E-1F9421, E-1F9422C

FIRE AREA A-2

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-2 is located on the 1974 elevation of the Auxiliary Building and includes the rooms listed in Table A-2-1.

Table A-2-1
Rooms Located in Fire Area A-2

ROOM #	DESCRIPTION
1111	Train A RHR Pump Room
1112	Train A Containment Spray Pump Room
1113	Train A Safety Injection Pump Room
1114	Train A Centrifugal Charging Pump Room

Fire area A-2 is protected with automatic fire detection throughout. In addition, the area is bounded on all sides by minimum 3-hour fire resistance rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-2-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-2-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-2

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
BG	Chemical and Volume Control System	R, M, S	Train A CVCS components could be affected. Train B CVCS is unaffected. A cable associated with VCT isolation valve BGLCV0112B may be affected. This will not prevent closing the valve from the control room using BGHIS0112B. VCT isolation valve BGLCV0112C is unaffected.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
BN	Borated Refueling Water Storage System	R, M, H	Valve BNHV8812A may be affected, preventing the valve from closing either automatically when EJHV8811A opens or manually from the control room. Valve EJHV8811A will remain closed to prevent the RWST from draining to the containment sump.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
EJ	Residual Heat Removal System	M, H, P	All PFSSD functions associated with the Residual Heat Removal (RHR) system are satisfied. The Train A RHR system may be affected. The Train B RHR system is unaffected. If valve EJHV8701B fails to respond when initiating RHR for cold shutdown, make a containment entry to manually open the valve or perform a cold shutdown repair to fix the damaged circuit.
EM	High Pressure Coolant Injection	R, M	Train A safety injection pump PEM01A could be affected. The fire will not cause the pump to spuriously start. The Train B safety injection pump is unaffected.

Table A-2-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-2

System	System Name	PFSSD Function*	Comments
EN	Containment Spray	R, M	Train A containment spray pump PEN01A could be affected. The fire will not cause the pump to spuriously start. The Train B containment spray pump is unaffected.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
GL	Auxiliary Building HVAC	S	The PFSSD function associated with the Auxiliary Building HVAC System is satisfied. The Train A RHR pump room cooler motor DSGL10A and Train A CCP pump room cooler motor DSGL12A may be affected. Train B room coolers/motors are available.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.

Table A-2-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-2

System	System Name	PFSSD Function*	Comments
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.

Table A-2-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-2

System	System Name	PFSSD Function*	Comments
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-2.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-2. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR

If valve EJHV8701B fails to respond when initiating RHR for cold shutdown, make a containment entry to manually open the valve or perform a cold shutdown repair to fix the damaged circuit.

4.0 CONCLUSION

Post Fire Safe Shutdown is assured if a fire occurs in fire area A-2.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-2.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-2

PFSSD components (S. in E-15000) located in fire area A-2 are shown in Table A-2-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-2-3.

Table A-2-3
PFSSD Equipment Located in Fire Area A-2

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1113	BGHV8104	Immediate Borate to Charging Pump Suction	5.1.1	
1114	BGHV8110	CCP A Miniflow Isolation Valve	5.1.1	
1114	BGHV8357A	CCP A Discharge To RCP Seals Valve	5.1.1	
1111	BNHV8812A	RWST To RHR Pump A Suction Valve	5.1.2	
1114	BNLCV0112D	Charging Pump A RWST Suction Valve	5.1.1	
1111	BNZS8812AA	RHR Pump A RWST Suction Valve Limit Switch	5.1.3	
1114	DPBG05A	Centrifugal Charging Pump A Motor	5.1.1	
1111	DPEJ01A	Residual Heat Removal Pump A Motor	5.1.3	
1113	DPEM01A	Safety Injection Pump A Motor	5.1.4	
1112	DPEN01A	Containment Spray Pump A Motor	5.1.5	
1111	DSGL10A	RHR Pump A Room Cooler Motor	5.1.3	
1114	DSGL12A	Centrifugal Charging Pump A Room Cooler Motor	5.1.1	
1111	EJFCV0610	RHR Mini Flow Isolation Valve Loop A	5.1.3	
1113	QJTE6244A	CVCS Heat Tracing RTD	5.1.6	
1113	QJTS6251	CVCS Heat Tracing Thermostat	5.1.6	
1113	TB11207	CVCS Heat Tracing Terminal Box	5.1.6	

5.1.1 Chemical and Volume Control System (CVCS)

A number of cables and components associated with Train A CVCS could be affected, as identified in Table A-2-3. In addition, RCP seal injection using Train A charging pump could be affected due to damage to valve BGHV8357A and associated cables. Damage to these cables and components could prevent operation of Train A CVCS. Train B CVCS and seal injection using Train B charging pump is unaffected by a fire in area A-2.

The Train A CCP pump room cooler motor DSGL12A could be affected by a fire in this area. Damage to the cooler motor or associated power cable will prevent operation of the room cooler. Train B CCP room cooler motor DSGL12B is unaffected by a fire in area A-2.

Valve BGHV8104 is included in the PFSSD design for cold shutdown after a control room fire. The valve is used in OFN RP-017A to establish long term boration for cold shutdown. The valve is not credited for hot standby. Cables associated with the valve are not included in the PFSSD design because the valve can be de-energized and manually opened if needed. A fire in this area that affects valve BGHV8104 will not adversely impact PFSSD.

Based on the above discussion, the Train B CVCS is available if a fire occurs in this area.

References: E-15000, XX-E-013, E-13BG01, E-13BG11B, E-13BG13, E-13BG52, E-13BN01, E-13GL05, E-13NB01, E-13NB13, E-1F9102, E-1F9205, E-1F9302, E-1F9401A, E-1F9444, M-12BG03, M-12BG05, M-12BN01, M-12GL01, OFN RP-017A

5.1.2 RWST to Containment Sump

Either valve BNHV8812A or valve EJHV8811A is required to be closed for PFSSD to prevent the RWST from draining to the containment sump. Valve BNHV8812A is normally open and valve EJHV8811A is normally closed. Valve BNHV8812A and associated power and control cables are run in fire area A-2. Damage to these cables could prevent closing the valve from the control room.

One cable (11EJG06AU) associated with valve EJHV8811A is run in fire area A-2. A hot short within this cable will send an open permissive to valve EJHV8811A. However, the valve will not open because ARA contacts installed on both sides of the position switch contact will prevent the valve from opening. Based on the above discussion, a fire in area A-2 will not cause the RWST to drain to the containment sump.

References: E-15000, XX-E-013, E-13BN03, E-13EJ06A, E-1F9102, E-1F9205, M-12BN01, M-12EJ01

5.1.3 Residual Heat Removal System

The power cable associated with Train A RHR pump motor DPEJ01A is run through area A-2. Damage to this cable will prevent operation of the pump. Cables associated with Train B RHR pump motor DPEJ01B are unaffected by a fire in area A-2.

Power and control cables associated with Train A RHR pump miniflow valve EJFCV0610 are run in area A-2. Damage to these cables could prevent operation of the valve and cause damage to the Train A RHR pump, if it is operating. Train B RHR miniflow valve EJFCV0611 is unaffected by a fire in area A-2.

The power cable associated with Train A RHR pump room cooler motor DSGL10A is run in area A-2. Damage to this cable will prevent operation of the room cooler. Train B RHR room cooler motor DSGL10B circuits are unaffected by a fire in area A-2.

RCS Loop 1 to Train A RHR pump inlet isolation valve BBPV8702A is required to remain closed during normal operation and hot standby and is required to be open when using Train A RHR for shutdown cooling. As discussed above, Train A RHR could be affected by a fire in this area, so Train A RHR is not credited.

Limit switch BNZS8812AA is located on valve BNHV8812A to provide an OPEN permissive to valve BBPV8702A when valve BNHV8812A is fully closed. This is one of several coincident permissives that need to be satisfied before the control room HIS can be enabled to initiate an open signal. Damage to cable 14BBG12AD could provide a false open signal but since the other permissives will not be satisfied, and since BBPV8702A is normally de-energized, the valve will remain closed. For these same reasons, damage to cable 11EJG05AG will not cause redundant valve EJHV8701A to open.

For shutdown cooling, an operable flowpath from the RCS to the operating RHR pump needs to be established. Since Train A RHR could be affected, the Train B RCS to RHR flow path is required. This involves opening valves BBPV8702B and EJHV8701B. Valve BBPV8702B is unaffected by a fire in area A-2. Damage to cable 11EJG05BG could prevent opening EJHV8701B when needed. A cold shutdown repair or local manual operation of EJHV8701B may be required prior to shutdown cooling.

Based on the above discussion, Train B RHR pump motor DPEJ01B and all associated components with the exception of EJHV8701B are unaffected by a fire in area A-2 and will be used to provide decay heat removal during cold shutdown. When lining up the RCS to the Train B RHR pump, it may be necessary to perform a cold shutdown repair or manually open EJHV8701B locally.

References: XX-E-013, E-15000, E-13BB12A, E-13BN03, E-13EJ01, E-13EJ05A, E-13EJ05B, E-13EJ08, E-13GL05, E-13NB01, E-13NB13, E-1F9205, E-1F9301, E-1F9401A, E-1F9444, M-12BB01, M-12BN01, M-12EJ01, M-12GL01

5.1.4 Safety Injection Pumps

The safety injection pumps are not required for PFSSD, but are included to evaluate the impact of a spuriously operating pump. Similarly, the power cables are not included because they are not required for PFSSD. The control cables, however, are included in the PFSSD analysis to evaluate whether damage will cause a spurious pump start.

Control cables associated with safety injection pump PEM01A are not run in fire area A-2. Therefore, a fire in area A-2 will not cause a spurious start of PEM01A. Damage to the pump will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-13EM01, E-1F9102, E-1F9302, M-12EM01

5.1.5 Containment Spray Pumps

The containment spray pumps are not required for PFSSD, but are included to evaluate the impact of a spuriously operating pump. Similarly, the power cables are not included because they are not required for PFSSD. The control cables, however, are included in the PFSSD analysis to evaluate whether damage will cause a spurious pump start.

Control cables associated with containment spray pump PEN01A are not run in fire area A-2. Therefore, a fire in area A-2 will not cause a spurious start of PEN01A. Damage to the pump will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-13EN01, E-1F9102, E-1F9302, M-12EN01

5.1.6 CVCS Heat Tracing

Heat tracing has been installed to maintain the emergency borate line and other fluid lines above the solidification temperature in the Train A SI pump room. Both safety trains can power the heat tracing; an automatic transfer switch (QJS0001) switches from Train A (primary source) to Train B (alternate source) on loss of A Train.

Fire area A-2 contains cables and components associated with the CVCS heat tracing system. Components of the heat tracing system located in this area are QJTS6251, QJTE6244A and TB11207. Cable 16QJY07KC is also located in this area.

Per Calculation XX-E-013, the emergency borate line and heat tracing is credited for long term boration after a control room fire. The heat tracing system is not credited for PFSSD where the fire is outside the control room. Although a fire in area A-2 could affect operation of the heat tracing system, the system is not required for a fire in area A-2. Loss of these components and cables will not adversely impact PFSSD. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-13NG13, E-13QJ07, DCP 13130

5.2 PFSSD CABLE EVALUATION

Table A-2-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-2. The applicable evaluation section is also listed in Table A-2-4.

Table A-2-4
PFSSD Cables Located in Fire Area A-2

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BGB01AA	1114	DPBG05A	P	5.1.1	Centrifugal Charging Pump A
11BGG11CA	1114	BGHV8110	P	5.1.1	Centrifugal Charging Pump A Mini Flow Valve
11BGG11CB	1114	BGHV8110	C	5.1.1	Centrifugal Charging Pump A Mini Flow Valve
11BGG12AD	1114	BGLCV0112B	C	5.2.1	BNLCV0112D Interlock
11BGG52AA	1114	BGHV8357A	P	5.1.1	CCP A Discharge to RCP Seals
11BGG52AB	1114	BGHV8357A	C	5.1.1	CCP A Discharge to RCP Seals
11BNG01AA	1114	BNLCV0112D	P	5.1.1	RWST to CCP A Suction Valve
11BNG01AB	1114	BNLCV0112D	C	5.1.1	RWST to CCP A Suction Valve
11BNG03AA	1111, 1113	BNHV8812A	P	5.1.2	RWST to RHR Pump A Suction Valve
11BNG03AB	1111, 1113	BNHV8812A	C	5.1.2	RWST to RHR Pump A Suction Valve
11EJB01AA	1111	DPEJ01A	P	5.1.3	RHR Pump A Motor
11EJG05AG	1111, 1113	EJHV8701A	C	5.1.3	BNHV8812A Interlock
11EJG05BG	1111, 1113	EJHV8701B	C	5.1.3	BNHV8812B Interlock
11EJG06AU	1111, 1113	EJHV8811A	C	5.1.2	BNHV8812A Interlock
11EJG08AB	1111, 1113	EJFCV0610	C	5.1.3	RHR Mini Flow Isolation Valve Loop A
11EJG08AE	1111, 1113	EJFCV0610	P	5.1.3	RHR Mini Flow Isolation Valve Loop A
11GLG05AA	1111, 1113	DSGL10A	P	5.1.3	RHR Pump A Room Cooler Motor
11GLG05GA	1114	DSGL12A	P	5.1.1	CCP A Room Cooler Motor
14BBG12AD	1111	BBPV8702A	C	5.1.3	BNHV8812A Interlock
16QJY07KC	1113	QJTS6251	P	5.1.6	CVCS Heat Tracing

5.2.1 Volume Control Tank (VCT) Outlet Valves

Either VCT isolation valve BGLCV0112B or BGLCV0112C needs to be closed for PFSSD to prevent hydrogen gas intrusion into the operating charging pump suction.

One control cable (11BGG12AD) associated with VCT valve BGLCV0112B runs through fire area A-2. Damage to this cable alone will not prevent closing BGLCV0112B from the control room. An intra-cable short within this cable will provide a permissive for valve BGLCV0112B to close. However, valve BGLCV0112B will close only upon presence of either a SIS or a VCT low-low level signal, coincident with an intra-cable short in cable 11BGG12AD. A fire in area A-2 will not cause a spurious SIS or VCT low-low level signal. An actual SIS is not required to be postulated. An actual VCT low-low level is possible because makeup to the VCT from letdown could be lost. However, a low-low VCT level signal will alert operators to swap to RWST before the VCT drains.

A short to ground on conductor 31 in cable 11BBG12AD coincident with a SIS or VCT low-low level signal will blow the control power fuse and prevent operation of valve BGLCV0112B. As stated above, a fire in area A-2 will not cause a spurious SIS or VCT low-low level signal. Therefore, there is reasonable assurance that valve BGLCV0112B can be operated from the control room prior to an actual low-low VCT level signal in the event of a fire in this area.

Cables for redundant VCT valve BGLCV0112C are run in a separate fire area and are unaffected by a fire in area A-2. Therefore, in the unlikely event valve BGLCV0112B cannot be operated, valve BGLCV0112C is available.

Based on the above discussion, there is reasonable assurance that either VCT outlet valve BGLCV0112B or BGLCV0112C can be isolated from the control room if a fire occurs in this area.

References: XX-E-013, E-15000, E-13BG12, E-1F9102, E-1F9302, M-12BG03

FIRE AREA A-3

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-3 is located on the 1974 and 2026 elevations of the Auxiliary Building and includes the rooms listed in Table A-3-1.

Table A-3-1
Rooms Located in Fire Area A-3

ROOM #	DESCRIPTION
1116	Boric Acid Tank Room B
1117	Boric Acid Tank Room A
1407	Boric Acid Batching Tank Area

Fire area A-3 is protected with automatic fire detection throughout. In addition, the area is bounded on all sides by minimum 3-hour fire resistance rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-3-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-3-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-3

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
AL	Aux. Feedwater System	H, P	The turbine driven auxiliary feedwater pump may not be available (See FC system discussion). The Train A and Train B motor driven auxiliary feedwater pumps are available.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
BB	Reactor Coolant System	R, M, H, P, S	All PFSSD functions associated with the reactor coolant system are satisfied. Valve BBHV8002A may be affected. Loss of inventory through the head vent valves is prevented by maintaining valves BBHV8001A and either BBHV8001B or BBHV8002B closed.
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. The Train A centrifugal charging pump (CCP) may not be available due to the potential loss of CCW to the oil cooler. The Train B CCP is unaffected. Valve BGHV8153A may be affected. Loss of inventory through the excess letdown flowpath is prevented by maintaining valves BGHV8154A and either BGHV8153B or BGHV8154B closed.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
EF	Essential Service Water System	H, S	The Train B ESW system is unaffected by a fire in this area. Cables asociated with valves EFHV0051 and EFHV0059 could be affected. Damage will not result in the valves spuriously operating. If Train A CCW is operating at the time of the fire, the valves will be in the required operating position and will not spuriously operate. The remaining portions of the Train A ESW system are unaffected.
EG	Component Cooling Water System	S	The Train B CCW system is unaffected by a fire in this area. Temperature control valve EGTV0029 could fail closed. This will not prevent operation of the Train A CCW system.

Table A-3-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-3

System	System Name	PFSSD Function*	Comments
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
FC	Auxiliary Turbines	R, H, P	Valves FCHV0312 and FCFV0313 may be affected by the fire, preventing steam flow to the turbine driven auxiliary feedwater pump turbine. The Train A and B motor driven auxiliary feedwater pumps are unaffected.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
GL	Auxiliary Building HVAC	S	Dampers GLHZ0080 and GLHZ0081 associated with the Train A CCW pump room cooler could be affected. This will not result in immediate inoperability of the Train A CCW pumps. The Train B CCW pump room cooler is unaffected.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.

Table A-3-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-3

System	System Name	PFSSD Function*	Comments
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.

Table A-3-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-3

System	System Name	PFSSD Function*	Comments
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-3.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-3. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post Fire Safe Shutdown is assured if a fire occurs in fire area A-3.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-3.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-3

There are no PFSSD components located in area A-3. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table A-3-3 lists all the PFSSD cables (S. in E-15000) located in fire area A-3. The applicable evaluation section is also listed in Table A-3-3.

Table A-3-3
PFSSD Cables Located in Fire Area A-3

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BBK30CA	1407	BBHV8002A	C	5.2.1	Reactor Vessel Head Vent Valve
11BGK48CB	1407	BGHV8153A	C	5.2.2	Excess Letdown Line Isolation Valve
11EFG04AA	1116	EFHV0059	P	5.2.3	ESW Return from CCW A Heat Exchanger Iso Valve
11EFG04AB	1116	EFHV0059	C	5.2.3	ESW Return from CCW A Heat Exchanger Iso Valve
11EFG05AA	1407	EFHV0051	P	5.2.3	ESW A to CCW Heat Exchanger A Iso Valve
11EFG05AB	1407	EFHV0051	C	5.2.3	ESW A to CCW Heat Exchanger A Iso Valve
11EGK16AA	1116	EGTV0029/EGTY0029A	C	5.2.3	CCW Heat Exchanger A Outlet Temp. Control Valve
11GLY27AB	1116	GLHZ0080	C	5.2.3	Train A CCW Pump Room Cooler discharge damper
11GLY27AD	1116	GLHZ0081	C	5.2.3	Train A CCW Pump Room Cooler discharge damper
12FCK23AX	1116, 1117	FCHV0312 FCFV0313	C	5.2.4	TDAFP Trip and Throttle Valve TDAFP Speed Governing Valve

5.2.1 Reactor Head Vent Valves

PFSSD requires that one of the two reactor vessel head vent valves on each flow path (2 flow paths total) be closed to prevent uncontrolled depressurization of the RCS. A cable (11BBK30CA) associated with one of the four head vent valves (BBHV8002A) runs through area A-3.

Cables for remaining head vent valves BBHV8001A, BBHV8001B and BBHV8002B are not run through A-3 and are unaffected by the fire. Therefore, at least one valve on each flow path can be controlled, and damage to the cable associated with BBHV8002A will have no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-13BB30, E-1F9301, M-12BB04

5.2.2 Excess Letdown Isolation Valves

PFSSD requires the excess letdown path be isolated to prevent uncontrolled depressurization of the RCS. To accomplish this, either normally closed valve BGHV8153A or BGHV8154A must be maintained closed and either normally closed valve BGHV8153B or BGHV8154B must be maintained closed.

One cable (11BGK48CB) associated with BGHV8153A runs through fire area A-3. Cables for the remaining excess letdown flowpath valves are unaffected by a fire in this area. Therefore, the excess letdown flowpath will remain closed if a fire occurs in this area.

References: E-15000, XX-E-013, E-13BG48, E-1F9301, M-12BG01

5.2.3 Component Cooling Water

For PFSSD, the component cooling water (CCW) system is used to provide cooling to the centrifugal charging pump (CCP) oil cooler, seal water heat exchanger, the RHR heat exchanger and the RHR pump seal cooler. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Valve EFHV0051 is the Essential Service Water (ESW) Train A to Component Cooling Water (CCW) Train A heat exchanger supply isolation valve and is required to be open when using Train A for PFSSD. Valve EFHV0059 is the return isolation valve from CCW Train A heat exchanger to the Ultimate Heat Sink (UHS). PFSSD requires that EFHV0059 be closed when using Train A CCW for plant shutdown following a fire and that valve EFV0058 be maintained in a locked throttled position to provide the minimum required ESW water flow. If valve EFHV0059 were to spuriously open when operating Train A ESW, flow imbalance could occur, which will result in flow depletion and inoperability of essential PFSSD components.

Power and control cables associated with EFHV0051 (11EFG05AA and 11EFG05AB) and EFHV0059 (11EFG04AA and 11EFG04AB) run in area A-3. Damage to these cables would not result in the valves spuriously operating. If Train A CCW is operating at the time of the fire, these valves would be in their required operating position and will not spuriously operate. Therefore, a fire in area A-3 would not result in a loss of control of ESW flow to Train A CCW.

Cables associated with Train B ESW to/from CCW valves are run in a different fire area and are unaffected by a fire in area A-3. Therefore, Train B ESW is available to supply the necessary cooling flow to the CCW Train B heat exchanger.

Cable 11EGK16AA is associated with Train A CCW heat exchanger outlet temperature control valve EGTV0029. Damage to this cable will either de-energize or partially energize the associated solenoid valve, causing the valve to fail closed. This will not prevent operation of

the Train A CCW system. Train B CCW Heat Exchanger Bypass Valve EGTV0030 is unaffected by a fire in this area.

Power and control cables associated with Train A CCW Pump Room cooler SGL11A exhaust dampers GLHZ0080 and GLHZ0081 are run in area A-3. Damage to these cables could prevent operation of the dampers. This is acceptable based on PIR 2000-2646 and Calculation GL-M-006. CCW train B room coolers will provide sufficient cooling for continued operation of Train A pumps. Cables associated with the Train B CCW pump room coolers SGL17B and SGL11B are unaffected by a fire in area A-3.

Based on the above discussion, Train A and Train B CCW are available if a fire occurs in this area.

References: E-15000, XX-E-013, E-13EF04, E-13EF05, E-13EG16, E-13GL27, E-1F9401A, E-1F9403, E-1F9444, M-12EF02, M-12EG02, M-12GL01, Calculation GL-M-006

5.2.4 Turbine Driven Auxiliary Feedwater Pump

The PFSSD design requires the use of one auxiliary feedwater pump supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

Cable 12FCK23AX is a control cable associated with valves FCHV0312 and FCHV0313. One conductor within this five conductor cable is used in the close circuit of valve FCHV0312 and the remaining four cables are used in the control circuit of valve FCFV0313. Damage to this cable could prevent operation of valves FCHV0312 and FCFV0313.

In the event valves FCHV0312 and FCFV0313 fail due to damage to this cable, the Train A and Train B Motor Driven Auxiliary Feedwater Pumps (MDAFPs) are available to supply auxiliary feedwater to steam generators A, B, C and D.

References: XX-E-013, E-15000, E-13FC23, E-13FC24, E-1F9202, M-12FC02

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1.0 GENERAL AREA DESCRIPTION

Fire area A-4 is located on the 1974 elevation of the Auxiliary Building and includes the rooms listed in Table A-4-1.

Table A-4-1
Rooms Located in Fire Area A-4

ROOM #	DESCRIPTION
1107	Train B Centrifugal Charging Pump Room
1108	Train B Safety Injection Pump Room
1109	Train B RHR Pump Room
1110	Train B Containment Spray Pump Room

Fire area A-4 is protected with automatic fire detection throughout. In addition, the area is bounded on all sides by minimum 3-hour fire resistance rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-4-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-4-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-4

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
BB	Reactor Coolant System	R, M, H, P, S	All PFSSD functions associated with the reactor coolant system are satisfied. When transferring to RHR, valve BBPV8702A may need to be manually opened, or a cold shutdown repair performed, to provide a suction source from the RCS to RHR pump A.
BG	Chemical and Volume Control System	R, M, S	Train B CVCS components could be affected. Train A CVCS is unaffected. VCT isolation valve BGLCV0112C may be affected. VCT isolation valve BGLCV0112B is unaffected.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
BN	Borated Refueling Water Storage System	R, M, H	Valve BNHV8812B may be affected, preventing the valve from closing either automatically when EJHV8811B opens or manually from the control room. Valve EJHV8811B will remain closed to prevent the RWST from draining to the containment sump.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
EJ	Residual Heat Removal System	M, H, P	The Train B RHR system may be affected. The Train A RHR system is unaffected.
EM	High Pressure Coolant Injection	R, M	Train B safety injection pump PEM01B could be affected. The fire will not cause the pump to spuriously start. The Train A safety injection pump is unaffected.
EN	Containment Spray	R, M	Train B containment spray pump PEN01B could be affected. The fire will not cause the pump to spuriously start. The Train A containment spray pump is unaffected.

Table A-4-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-4

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
GL	Auxiliary Building HVAC	S	The PFSSD function associated with the Auxiliary Building HVAC System is satisfied. The Train B RHR pump room cooler SGL10B and CCP pump room cooler SGL12B may be affected. Train A room coolers are available.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.

Table A-4-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-4

System	System Name	PFSSD Function*	Comments
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.

Table A-4-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-4

System	System Name	PFSSD Function*	Comments
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-4.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-4. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR

If valve BBPV8702A fails to respond when initiating RHR for cold shutdown, make a containment entry to manually open the valve or perform a cold shutdown repair to fix the damaged circuit.

4.0 CONCLUSION

Post Fire Safe Shutdown is assured if a fire occurs in fire area A-4.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-4.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-4

PFSSD components (S. in E-15000) located in fire area A-4 are shown in Table A-4-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-4-3.

Table A-4-3
PFSSD Equipment Located in Fire Area A-4

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1107	BGHV8111	CCP B Miniflow Isolation Valve	5.1.1	
1107	BGHV8357B	CCP B Discharge To RCP Seals Valve	5.1.1	
1109	BNHV8812B	RWST To RHR Pump B Suction Valve	5.1.2	
1107	BNLCV0112E	Charging Pump B RWST Suction Valve	5.1.1	
1109	BNZS8812BA	RWST To RHR Pump B Suction Valve Limit Switch	5.1.3	
1107	DPBG05B	Centrifugal Charging Pump B Motor	5.1.1	
1109	DPEJ01B	Residual Heat Removal Pump B Motor	5.1.3	
1108	DPEM01B	Safety Injection Pump B Motor	5.1.4	
1110	DPEN01B	Containment Spray Pump B Motor	5.1.5	
1109	DSGL10B	RHR Pump Room B Cooler Motor	5.1.3	
1107	DSGL12B	Centrifugal Charging Pump Room B Cooler Motor	5.1.1	
1107	EJFIS0611	Train B RHR Mini Flow Indicating Switch	5.1.3	
1108	EJHV8804B	RHR B to SI Pump B Isolation Valve	5.1.3	
1109	EJFCV0611	RHR Mini Flow Isolation Valve Loop B	5.1.3	
1108	EJZS8804BB	RHR B To SI Pump Iso Valve Limit Switch	5.1.3	

5.1.1 Chemical and Volume Control System (CVCS)

A number of cables and components associated with Train B CVCS could be affected, as identified in Table A-4-3. In addition, RCP seal injection using Train B charging pump could be affected due to damage to valve BGHV8357B and associated cables. Damage to these cables and components could prevent operation of Train B CVCS.

The Train B centrifugal charging pump (CCP) room cooler and associated power cable is located in this area. Damage to the motor and/or cable will prevent operation of the room cooler. Loss of the room cooler could prevent proper operation of the Train B CCP.

Train A CVCS and seal injection using Train A charging pump is unaffected by a fire in area A-4. Cables associated with Train A CVCS are located in a separate fire area and are unaffected by a fire in this area.

References: E-15000, XX-E-013, E-13BG01A, E-13BG11C, E-13BG52, E-13BN01A, E-13GL05, E-1F9102, E-1F9302, E-1F9401A, E-1F9444, M-12BG03, M-12BN01, M-12GL02

5.1.2 RWST to Containment Sump

Either valve BNHV8812B or valve EJHV8811B is required to be closed for PFSSD to prevent the RWST from draining to the containment sump. Valve BNHV8812B is normally open and valve EJHV8811B is normally closed. Valve BNHV8812B and associated power and control cables are run in fire area A-4. Damage to these cables could prevent closing the valve from the control room.

One cable (14EJG06BF) associated with valve EJHV8811B is run in fire area A-4. A hot short within this cable will send an OPEN permissive to valve EJHV8811B. However, the valve will not open because ARA contacts installed on both sides of the position switch contact will prevent the valve from opening.

Based on the above discussion, a fire in area A-4 will not cause the RWST to drain to the containment sump.

References: E-15000, XX-E-013, E-13BN03A, E-13EJ06B, E-1F9102, E-1F9205, M-12BN01, M-12EJ01

5.1.3 Residual Heat Removal System

The decay heat removal function requires an available RHR flowpath taking suction from the RCS and discharging cooled water back to the RCS. During normal operation and hot standby, the RHR system is not required and the RCS to RHR suction isolation valves must remain closed.

The power cable associated with Train B RHR pump motor DPEJ01B is run through area A-4. Damage to this cable will prevent operation of the pump. Cables associated with Train A RHR pump motor DPEJ01A are unaffected by a fire in area A-4.

Power and control cables associated with Train B RHR pump miniflow valve EJFCV0611 are run in area A-4. Damage to these cables could prevent operation of the valve and cause damage to the Train B RHR pump, if it is operating. Train A RHR miniflow valve EJFCV0610 is unaffected by a fire in area A-4.

The power cable associated with Train B RHR pump room cooler SGL10B is run in area A-4. Damage to this cable will prevent operation of the room cooler. Train A RHR pomp room cooler SGL10A circuits are unaffected by a fire in area A-4.

RCS Loop 1 to Train A RHR pump inlet isolation valves BBPV8702A and EJHV8701A are required to remain closed during normal operation and hot standby and are required to be open when using Train A RHR for shutdown cooling. RCS Loop 4 to Train B RHR pump inlet isolation valves BBPV8702B and EJHV8701B are required to remain closed during normal operation and hot standby and are required to be open when using Train B RHR for shutdown cooling. All four valves are normally closed with the breaker de-energized to prevent accidental opening of the valves. Power cables for these valves are not run in fire area A-4.

Cables 11EJG05BF and 11EJG05BG are associated with open permissives on valve EJHV8701B control circuit. Cable 11EJG05BF is tied to limit switch EJZS8804BB on valve EJHV8804B. Cable 11EJG05BG is tied to limit switch BNZS8812BA on valve BNHV8812B. Damage to these cables or limit switch could provide a false open permissive or could prevent the valve from being open when needed. The false open permissive will not cause the valve to open because the MOV is normally de-energized. As stated above, other Train B RHR components could be affected, so Train B RHR is not credited for shutdown cooling.

Valve EJHV8804B is the RHR pump B to Safety Injection pump isolation valve. Cable 14EJG04BA is the power cable for valve EJHV8804B. Cable 14EJG04BB is a control cable for valve EJHV8804B. Valve EJHV8804B is normally closed and is required to remain closed during RHR Train B operation. As stated throughout this section, the Train A RHR pump is credited if a fire occurs in this area. Therefore, spurious opening of this valve will not adversely impact PFSSD.

Cable 14BBG12AD is associated with an open permissive on valve BBPV8702A. Damage to this cable could provide a false open permissive or could prevent the valve from being open when needed. The false open permissive will not cause the valve to open because the MOV is normally de-energized. Since Train A RHR is credited for shutdown cooling if a fire occurs in this area, valve BBPV8702A is required to be open when lining up RHR. An open circuit or short to ground in this cable will prevent opening the valve when needed. Therefore, a containment entry to open the valve or cold shutdown repair may be necessary prior to establishing shutdown cooling.

Cables 14BBG12BC and 14BBG12BD are associated with open permissives on valve BBPV8702B. Damage to these cables could provide a false open permissive or could prevent the valve from being open when needed. The false open permissive will not cause the valve to

open because power is normally de-energized. As stated above, other Train B RHR components could be affected, so Train B RHR is not credited for shutdown cooling.

Based on the above discussion, Train A RHR pump PEJ01A and associated components are unaffected by a fire in area A-4 and will be used to provide decay heat removal during cold shutdown. When lining up the RCS to the Train A RHR pump, it may be necessary to perform a cold shutdown repair or manually open BBPV8702A locally.

References: XX-E-013, E-15000, E-13BB12A, E-13BB12B, E-13EJ01, E-13EJ04B, E-13EJ05B, E-13EJ08, E-13EJ08A, E-13GL05, E-1F9205, E-1F9301, E-1F9401A, E-1F9444, M-12BB01, M-12EJ01, M-12GL02

5.1.4 Safety Injection Pumps

The safety injection pumps are not required for PFSSD, but are included to evaluate the impact of a spuriously operating pump. The power cables are not included because they are not required for PFSSD. The control cables, however, are included in the PFSSD analysis to evaluate whether damage will cause a spurious pump start.

Control cables associated with safety injection pump PEM01B are not run in fire area A-4. Therefore, a fire in area A-4 will not cause a spurious start of PEM01B. Damage to the pump will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, M-12EM01

5.1.5 Containment Spray Pumps

The containment spray pumps are not required for PFSSD, but are included to evaluate the impact of a spuriously operating pump. The power cables are not included because they are not required for PFSSD. The control cables, however, are included in the PFSSD analysis to evaluate whether damage will cause a spurious pump start.

Control cables associated with containment spray pump PEN01B are not run in fire area A-4. Therefore, a fire in area A-4 will not cause a spurious start of PEN01B. Damage to the pump will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, M-12EN01

5.2 PFSSD CABLE EVALUATION

Table A-4-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-4. The applicable evaluation section is also listed in Table A-4-4.

Table A-4-4
PFSSD Cables Located in Fire Area A-4

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EJG05BF	1108	EJHV8701B	C	5.1.3	EJHV8804B Interlock
11EJG05BG	1109	EJHV8701B	C	5.1.3	BNHV8812B Interlock
14BBG12AD	1108, 1109	BBPV8702A	C	5.1.3	BNHV8812A Interlock
14BBG12BC	1108	BBPV8702B	C	5.1.3	EJHV8804B Interlock
14BBG12BD	1108, 1109	BBPV8702B	C	5.1.3	BNHV8812B Interlock
14BGB01BA	1107	DPBG05B	P	5.1.1	Train B Centrifugal Charging Pump Motor
14BGG11DA	1107	BGHV8111	P	5.1.1	Train B CCP Miniflow Valve
14BGG11DB	1107	BGHV8111	C	5.1.1	Train B CCP Miniflow Valve
14BGG12BD	1107, 1108	BGLCV0112C	C	5.2.1	BNLCV0112E Interlock
14BGG52BA	1107	BGHV8357B	P	5.1.1	Train B RCP Seal Injection Valve
14BGG52BB	1107	BGHV8357B	C	5.1.1	Train B RCP Seal Injection Valve
14BNG01BA	1107, 1108	BNLCV0112E	P	5.1.1	RWST to CCP B MOV
14BNG01BB	1107, 1108	BNLCV0112E	C	5.1.1	RWST to CCP B MOV
14BNG03BA	1108, 1109	BNHV8812B	P	5.1.2	RWST to RHR Pump B Suction Valve
14BNG03BB	1108, 1109	BNHV8812B	C	5.1.2	RWST to RHR Pump B Suction Valve
14EJB01BA	1109	DPEJ01B	P	5.1.3	Train B RHR Pump Motor
14EJG04BA	1108	EJHV8804B	P	5.1.3	Train B RHR Pump to SI Pumps
14EJG04BB	1108	EJHV8804B	C	5.1.3	Train B RHR Pump to SI Pumps
14EJG06BF	1108, 1109	EJHV8811B	C	5.1.2	BNHV8812B Interlock
14EJG08BB	1108, 1109	EJFCV0611	C	5.1.3	Train B RHR Pump Miniflow Valve
14EJG08BE	1108, 1109	EJFCV0611	P	5.1.3	Train B RHR Pump Miniflow Valve
14EJG08BF	1107	EJFIS0611	C	5.1.3	RHR B Mini Flow Indicating Switch
14GLG05BA	1108, 1109	DSGL10B	P	5.1.3	RHR B Pump Room Cooler Motor
14GLG05HA	1107, 1108	DSGL12B	P	5.1.1	CCP B Pump Room Cooler Motor

5.2.1 Volume Control Tank (VCT) Isolation Valve (BGLCV0112B)

One control cable associated with VCT valve BGLCV0112C runs through fire area A-4. Cables for redundant VCT valve BGLCV0112B are run in a separate fire area and are unaffected by a fire in area A-4. The PFSSD position of these valves is at least one closed. Therefore, PFSSD can be accomplished by isolation of BGLCV0112B.

Damage to cable 14BGG12BD could provide a permissive for valve BGLCV0112C to close. If this occurs prior to establishing suction from the RWST, damage to the operating charging pump could occur due to loss of suction. Valve BGLCV0112C will close only upon presence of either a SIS or a VCT low-low level signal, coincident with postulated cable 14BGG12BD damage. A fire in area A-4 will not cause a spurious SIS or VCT low-low level signal. Therefore, valve BGLCV0112C will not spuriously close.

Based on the above discussion, the ability to achieve and maintain PFSSD is unaffected by a fire in area A-4, which affects VCT valve BGLCV0112C. Therefore, the configuration is acceptable.

References: XX-E-013, E-15000, E-13BG12A, E-1F9102, E-1F9302, M-12BG03

FIRE AREA A-5

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-5 is located on the South side of the Auxiliary Building and includes the rooms listed in Table A-5-1.

Table A-5-1
Rooms Located in Fire Area A-5

ROOM #	DESCRIPTION
1119	Aux Building South Stairway 1974 to 2062 Elevation
1601	Elevator Machine Room

Fire area A-5 has no installed automatic fire suppression system. An automatic fire detector is installed at the top of the stairway at the 2047 foot elevation.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-5-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-5-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-5

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.

Table A-5-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-5

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.

Table A-5-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-5

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
PA	13.8kV	S	Breakers PA0105 and PA0206 could trip. This will not affect PFSSD since redundant capability exists.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.

Table A-5-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-5

System	System Name	PFSSD Function*	Comments
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-5.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-5. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-Fire Safe Shutdown capability is assured if a severe fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-5.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-5

There are no PFSSD components located in area A-5. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table A-5-3 lists all the PFSSD cables (S. in E-15000) located in fire area A-5. The applicable evaluation section is also listed in Table A-5-3.

Table A-5-3
PFSSD Cables Located in Fire Area A-5

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15PGA10AA	1119	PA0105	C	5.2.1	Load Centers PG11, PG13 and PG25 Fdr Bkr
16PGA10CA	1119	PA0206	C	5.2.1	Load Centers PG12, PG16 and PG26 Fdr Bkr

5.2.1 Load Center Feeder Breakers PA0105 and PA0206

Load center feeder breakers PA0105 and PA0206 are credited for PFSSD because they supply power to credited non-safety related loads. Cables associated with these breakers run in this area. PFSSD impact due to damage to these cables is discussed below.

Cable 15PGA10AA is a control cable associated with breaker PA0105 and runs in fire area A-5. An intra-cable hot short in this cable will trip PA0105. Breaker PA0105 supplies power to the following PFSSD components:

- PG11JFR2 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0031
- PG11KBR3 – Auxiliary Steam System Control Valve FBHV0081

PG11JFR2 and PG11KBR3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using hand switch ABHS0079 or ABHS0080. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

The cable note in Setroute for cable 15PGA10AA states that the cable is located within a heat affected zone per M-663-00017A and requires further fire protection review if credited for PFSSD. The heat affected zone evaluation is discussed in M-663-00017A, Appendix B13, pages B-13-64 through B-13-69 and occurs where the cable passes between fire areas A-5 (Roomn 1119) and A-16 South (Room 1408). Since the cable traverses both fire areas and is not credited for a fire in either area, there will be no adverse impact on PFSSD if a fire occurs in areas A-5 or A-16 South.

Cable 16PGA10CA is a control cable associated with breaker PA0206 and runs in fire area A-5. An intra-cable hot short in this cable will trip PA0206. Breaker PA0206 supplies power to the following PFSSD components:

- PG12KAF4 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0032
- PG12KAF5 – Main Steam Supply to Steam Seals Valve ABHV0046
- PG12KEF3 – Auxiliary Steam System Control Valve FBHV0080

PG12KAF4, PG12KAF5 and PG12KEF3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using hand switch ABHS0079 or ABHS0080. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Based on the above discussion, loss of breakers PA0105 and PA0206 will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-13PG10, E-1F9424E, M-663-00017A

FIRE AREA A-6

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-6 comprises stairway A-2 located on the North side of the Auxiliary Building and includes the rooms listed in Table A-6-1.

Table A-6-1
Rooms Located in Fire Area A-6

ROOM #	DESCRIPTION
1127	Aux Building North Stairway 1974 to 2047 Elevation

Fire area A-6 has no installed automatic fire suppression system. An automatic fire detector is installed at the top of the stairway at the 2047 foot elevation.

Circuits associated with redundant success paths are run through this area. In some cases, one success path is protected with a raceway fire barrier material meeting the requirements for a 3-hour fire rating. The 3-hour electrical raceway fire wrap meets Wolf Creek's commitments to 10CFR50, Appendix R Section III.G.2(a). This fire barrier provides reasonable assurance that circuits enclosed within the barrier will be unaffected by a fire in area A-6.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-6-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-6-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-6

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	ABHS0080 is available to close the MSIVs. Steam generator ARV ABPV0004 may spuriously open. Steam generator ARVs ABPV0001, ABPV0002 and ABPV0003 are unaffected.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
AE	Main Feedwater	H, P	All PFSSD functions associated with the main feedwater system are satisfied. All four main feedwater isolation valves can be isolated using hand switch AEHS0080.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. The Train A motor driven AFW pump is available to supply feedwater to steam generators B and C using appropriate Train A valves. Several Train B components could be affected by the fire. The turbine driven AFW pump may be unavailable.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blowdown system are satisfied. Steam generator blowdown is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C, located on the BM157 panel in the radwaste control room.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
EG	Component Cooling Water System	S	Valve EGHV0062 could spuriously close due to a spurious high CCW flow condition due to damage to EGFT0062. Bypass valve EGHV0132 is unaffected. RCP seal injection is unaffected. CCW flow indicators EGFI0128 and EGFI0129 are unaffected.

Table A-6-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-6

System	System Name	PFSSD Function*	Comments
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
FC	Auxiliary Turbines	R, H, P	Valves FCHV0312 and FCFV0313 may be affected by the fire, preventing steam flow to the turbine driven auxiliary feedwater pump turbine. The Train A motor driven auxiliary feedwater pump is unaffected.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
GF	AFW Pump Room Coolers	S	The PFSSD Support function associated with the AFW Pump Room Coolers is satisfied. The Train A Motor Driven AFW Pump is used for a fire in area A-6. Auxiliary Feedwater Pump A room cooler SGF02A is available. ESW Train A is available to supply the room cooler.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.

Table A-6-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-6

System	System Name	PFSSD Function*	Comments
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.

Table A-6-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-6

System	System Name	PFSSD Function*	Comments
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-6.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-6. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs

It may be necessary to fail close ABPV0004 by isolating the air and nitrogen supply, then venting air from the regulators. This action can be performed by an operator in fire area A-23. Access to area A-23 would need to be made through the emergency escape hatch from the Turbine Building 2015 elevation. The operator performing this action may need a flashlight in the escape hatch area but the main area of A-23 is provided with emergency lights.

3.1.2 Steam Generator Blowdown to Blowdown Flash Tank Isolation

If a fire occurs in area A-6, cables for BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A may be damaged by the fire. Therefore, use BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C located on the BM157 panel in the Radwaste Control room to close valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Main Steam Isolation Valves and MSIV Bypass Valves

Hand switch ABHS0079 may not be effective in closing the MSIVs and ensuring the MSIV bypass valves remain closed. ABHS0080 is unaffected by the fire and should be used to close the MSIVs and bypass valves.

3.2.2 Main Feedwater Isolation Valves

Cables for hand switch AEHS0081 may be damaged. Cables for redundant hand switch AEHS0080 are unaffected. Therefore, use AEHS0080 to close the MFIVs.

3.2.3 Thermal Barrier Cooling

RCP Thermal Barrier Cooling valve EGHV0062 could spuriously close. Operators can diagnose this condition using flow indicators EGFI0128 and EGFI0129. If necessary, bypass valve EGHV0132 can be opened. RCP seal injection is unaffected.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None specific to PFSSD

4.0 CONCLUSION

With some exceptions, redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-6.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-6

PFSSD components (S. in E-15000) located in fire area A-6 are shown in Table A-6-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-6-3.

Table A-6-3 PFSSD Components Located in Fire Area A-6				
Room #	**PFSSD Component**	**Component Description**	**Evaluation Section**	**Comments**
1127	EGFT0062	RCP Thermal Barrier Outlet Flow	5.1.1	

5.1.1 CCW Flow From RCP Thermal Barriers

For PFSSD, the component cooling water (CCW) system is used to provide cooling to the centrifugal charging pump (CCP) oil cooler, the RHR heat exchanger and the RHR pump seal cooler. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Flow transmitter EGFT0062 and cable 14EGI15AA are located in this fire area. The flow transmitter monitors CCW outlet flow from the thermal barriers and automatically shuts valve EGHV0062 on a high flow signal. A fire could damage the flow transmitter and/or cable, causing a spurious high flow signal and close the valve. If this occurs, CCW flow to the thermal barriers would be lost until operators open bypass valve EGHV0132 from the control room.

Spurious closure of EGHV0062 would be indicated in the control room as a reduction in flow on flow indicators EGFI0128 and EGFI0129.

A fire in area A-6 will not cause a loss of RCP seal injection. Therefore, loss of thermal barrier cooling will have no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-13EG10, E-13EG15, E-1F9303

5.2 PFSSD CABLE EVALUATION

Table A-6-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-6. The applicable evaluation section is also listed in Table A-6-4.

Table A-6-4
PFSSD Cables Located in Fire Area A-6

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ABI20EA	1127	ABPV0001	I	5.2.1	Steam Generator A ARV
11ABI21JA	1127	ABPT0514	I	5.2.2	Steam Generator A Pressure Transmitter
11ABI21MA	1127	ABPT0524	I	5.2.2	Steam Generator B Pressure Transmitter
11ABI21RA	1127	ABPT0534	I	5.2.2	Steam Generator C Pressure Transmitter
11ABI21UA	1127	ABPT0544	I	5.2.2	Steam Generator D Pressure Transmitter
11ABK23AA	1127	ABHV0012	C	5.2.3	MSIV ABHV0011 Bypass Valve
11ABK23AB	1127	ABHV0015	C	5.2.3	MSIV ABHV0014 Bypass Valve
11ABK23AC	1127	ABHV0018	C	5.2.3	MSIV ABHV0017 Bypass Valve
11ABK23AD	1127	ABHV0021	C	5.2.3	MSIV ABHV0020 Bypass Valve
11ABK28AH	1127	ABHV0014	C	5.2.3	Steam Generator B MSIV
11ABK28BH	1127	ABHV0020	C	5.2.3	Steam Generator D MSIV
11ABK29AH	1127	ABHV0017	C	5.2.3	Steam Generator C MSIV
11ABK29BH	1127	ABHV0011	C	5.2.3	Steam Generator A MSIV
11AEK16AH	1127	AEFV0039	C	5.2.4	Steam Generator A Feedwater Isolation Valve
11AEK16BH	1127	AEFV0041	C	5.2.4	Steam Generator C Feedwater Isolation Valve
11AEK17AH	1127	AEFV0040	C	5.2.4	Steam Generator B Feedwater Isolation Valve
11AEK17BH	1127	AEFV0042	C	5.2.4	Steam Generator D Feedwater Isolation Valve
11ALG02BA	1127	ALHV0035	P	5.2.5	CST to Train A MDAFP
11ALG02BB	1127	ALHV0035	C	5.2.5	CST to Train A MDAFP
11ALG02CA	1127	ALHV0036	P	5.2.5	CST to TDAFP
11ALG02CB	1127	ALHV0036	C	5.2.5	CST to TDAFP
11ALG04BA	1127	ALHV0031	P	5.2.5	ESW to Train A MDAFP
11ALG04BB	1127	ALHV0031	C	5.2.5	ESW to Train A MDAFP

Table A-6-4
PFSSD Cables Located in Fire Area A-6

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ALG04CA	1127	ALHV0032	P	5.2.5	Train A ESW to MDAFP A
11ALG04CB	1127	ALHV0032	C	5.2.5	Train A ESW to MDAFP A
11ALI03AD	1127	ALHV0009	I	5.2.5	Train A MDAFP Discharge to SG B
11ALI03AE	1127	ALHV0009	I	5.2.5	Train A MDAFP Discharge to SG B
11ALI03AF	1127	ALHV0009	I	5.2.5	Train A MDAFP Discharge to SG B
11ALI03BD	1127	ALHV0011	I	5.2.5	Train A MDAFP Discharge to SG C
11ALI03BE	1127	ALHV0011	I	5.2.5	Train A MDAFP Discharge to SG C
11ALI03BF	1127	ALHV0011	I	5.2.5	Train A MDAFP Discharge to SG C
11ALI05AD	1127	ALHV0006	I	5.2.5	TDAFP Discharge to SG D
11ALI05AE	1127	ALHV0006	I	5.2.5	TDAFP Discharge to SG D
11ALI05AF	1127	ALHV0006	I	5.2.5	TDAFP Discharge to SG D
11ALI05BD	1127	ALHV0008	I	5.2.5	TDAFP Discharge to SG A
11ALI05BE	1127	ALHV0008	I	5.2.5	TDAFP Discharge to SG A
11ALI05BF	1127	ALHV0008	I	5.2.5	TDAFP Discharge to SG A
11ALI07JA	1127	ALPT0025	I	5.2.5	MDAFP A Suction pressure
11ALI08AA	1127	ALPT0037	I	5.2.5	ESFAS Low CST Suction Pressure
11ALI09BA	1127	ALFT0009	I	5.2.5	AFW to SG B Flow Transmitter
11ALI09CA	1127	ALFT0011	I	5.2.5	AFW to SG C Flow Transmitter
11BMK06EA	1127	BMHV0001	C	5.2.6	SG Blowdown to Flash Tank
11BMK06FA	1127	BMHV0002	C	5.2.6	SG Blowdown to Flash Tank
11BMK06GA	1127	BMHV0003	C	5.2.6	SG Blowdown to Flash Tank
11BMK06HA	1127	BMHV0004	C	5.2.6	SG Blowdown to Flash Tank
11GFG01AA	1127	SGF02A	P	5.2.5	Train A AFW Pump Room Cooler

Table A-6-4
PFSSD Cables Located in Fire Area A-6

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GFG01AB	1127	SGF02A	C	5.2.5	Train A AFW Pump Room Cooler
12FCK23AX	1127	FCHV0312 FCFV0313	C	5.2.5	TDAFP Trip and Throttle Valve TDAFP Speed Governing Valve
14ABI20HE	1127	ABPV0004	I	5.2.1	Steam Generator D ARV
14ABI20HH	1127	ABPV0004	I	5.2.1	Steam Generator D ARV
14ABI21LA	1127	ABPT0516	I	5.2.2	Steam Generator A Pressure Transmitter
14ABI21WA	1127	ABPT0546	I	5.2.2	Steam Generator D Pressure Transmitter
14ABK23FA	1127	ABHV0012	C	5.2.3	MSIV ABHV0011 Bypass Valve
14ABK23FB	1127	ABHV0015	C	5.2.3	MSIV ABHV0014 Bypass Valve
14ABK23FC	1127	ABHV0018	C	5.2.3	MSIV ABHV0017 Bypass Valve
14ABK23FD	1127	ABHV0021	C	5.2.3	MSIV ABHV0020 Bypass Valve
14ABK28AH	1127	ABHV0017	C	5.2.3	Steam Generator C MSIV
14ABK28BH	1127	ABHV0011	C	5.2.3	Steam Generator A MSIV
14ABK29AH	1127	ABHV0014	C	5.2.3	Steam Generator B MSIV
14ABK29BH	1127	ABHV0020	C	5.2.3	Steam Generator D MSIV
14AEK16AH	1127	AEFV0040	C	5.2.4	Steam Generator B Feedwater Isolation Valve
14AEK16BH	1127	AEFV0042	C	5.2.4	Steam Generator D Feedwater Isolation Valve
14AEK17AH	1127	AEFV0039	C	5.2.4	Steam Generator A Feedwater Isolation Valve
14AEK17BH	1127	AEFV0041	C	5.2.4	Steam Generator C Feedwater Isolation Valve
14ALG02AA	1127	ALHV0034	P	5.2.5	CST to Train B MDAFP
14ALG02AB	1127	ALHV0034	C	5.2.5	CST to Train B MDAFP
14ALG02AJ	1127	ALHV0034	C	5.2.5	CST to Train B MDAFP
14ALG04AA	1127	ALHV0030	P	5.2.5	ESW to Train B MDAFP

Table A-6-4
PFSSD Cables Located in Fire Area A-6

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALG04AB	1127	ALHV0030	C	5.2.5	ESW to Train B MDAFP
14ALG04AJ	1127	ALHV0030	C	5.2.5	ESW to Train B MDAFP
14ALG04DA	1127	ALHV0033	P	5.2.5	Train B ESW to TDAFP
14ALG04DB	1127	ALHV0033	C	5.2.5	Train B ESW to TDAFP
14ALG04DJ	1127	ALHV0033	C	5.2.5	Train B ESW to TDAFP
14ALI03AJ	1127	ALHV0005	I	5.2.5	Train B MDAFP to SG D
14ALI03AK	1127	ALHV0005	I	5.2.5	Train B MDAFP to SG D
14ALI03AL	1127	ALHV0005	I	5.2.5	Train B MDAFP to SG D
14ALI03BD	1127	ALHV0007	I	5.2.5	Train B MDAFP to SG A
14ALI03BE	1127	ALHV0007	I	5.2.5	Train B MDAFP to SG A
14ALI03BF	1127	ALHV0007	I	5.2.5	Train B MDAFP to SG A
14ALI05AG	1127	ALHV0010	I	5.2.5	TDAFP to SG B
14ALI05AH	1127	ALHV0010	I	5.2.5	TDAFP to SG B
14ALI05AJ	1127	ALHV0010	I	5.2.5	TDAFP to SG B
14ALI05BD	1127	ALHV0012	I	5.2.5	TDAFP to SG C
14ALI05BE	1127	ALHV0012	I	5.2.5	TDAFP to SG C
14ALI05BF	1127	ALHV0012	I	5.2.5	TDAFP to SG C
14ALI07AD	1127	ALFT0001	I	5.2.5	AFW to SG D Flow Transmitter
14ALI07HD	1127	ALPT0024	I	5.2.5	MDAFP B Suction pressure
14ALI08CA	1127	ALPT0039	I	5.2.5	ESFAS Low CST Suction Pressure
14ALI09AA	1127	ALFT0007	I	5.2.5	AFW to SG A Flow Transmitter
14ALY09AB	1127	ALHV0005	P	5.2.5	Train B MDAFP Discharge to SG D
14ALY09BB	1127	ALHV0007	P	5.2.5	Train B MDAFP Discharge to SG A

Table A-6-4
PFSSD Cables Located in Fire Area A-6

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BMK06AA	1127	BMHV0001	C	5.2.6	SG Blowdown to Flash Tank
14BMK06BA	1127	BMHV0002	C	5.2.6	SG Blowdown to Flash Tank
14BMK06CA	1127	BMHV0003	C	5.2.6	SG Blowdown to Flash Tank
14BMK06DA	1127	BMHV0004	C	5.2.6	SG Blowdown to Flash Tank
14FCK21AA	1127	FCFV0310	C	5.2.7	TDAFP Steam Trap Isolation Valve
14EGI15AA	1127	EGFT0062	I	5.1.1	CCW Flow from RCP Thermal Barriers
14GFG01BA	1127	SGF02B	P	5.2.5	Train B MADFP Room Cooler
14GFG01BB	1127	SGF02B	C	5.2.5	Train B MADFP Room Cooler

5.2.1 Steam Generator Atmospheric Relief Valves

Post fire safe shutdown (PFSSD) requires an operable auxiliary feedwater supply to at least two steam generators and control of the two associated steam generator atmospheric relief valves (SGARVs). In addition, the SGARVs on the other two steam generators are required to be closed. Cables associated with SGARVs ABPV0001 and ABPV0004 run through area A-6.

Cable 11ABI20EA is an instrument cable that runs from pressure transmitter ABPT0001, in Area 5 of the Auxiliary Building, to panel RP053AC in the control room. Pressure transmitter ABPT0001 monitors steamline pressure on loop 1. High steamline pressure (1125 psig or greater) sensed by ABPT0001 will send a signal to open ABPV0001. A spurious high pressure signal due to damage to the cable could open the ARV. The cable is run in tray 111J1L01, which has been wrapped with a 3-hour fire rated barrier. The 3-hour fire barrier provides reasonable assurance that damage to cable 11ABI20EA will not occur. Therefore, SGARV ABPV0001 is unaffected by a fire in area A-6.

Cable 14ABI20HE is an instrument cable that runs from panel RP147B in the Train B ESF switchgear room to pressure transducer ABPY0004 in Area 5 of the Auxiliary Building. Cable 14ABI20HH is an instrument cable that runs from pressure transmitter ABPT0004 in Area 5 of the Auxiliary Building to panel RP147B. High steamline pressure (1125 psig or greater) sensed by ABPT0004 will send a signal to open ABPV0004. Damage to either of these cables could prevent control of the ARV from the control room and auxiliary shutdown panel, and could cause the spurious opening of the ARV.

Spurious opening of ARV ABPV0004 will not impact PFSSD and is bounded by the main steamline break analysis. Access to the steam tunnel is available through the emergency escape hatch, which is accessible from the Turbine Building 2015 elevation south. If ARV ABPV0004 spuriously opens, an operator can enter the steam tunnel through the escape hatch and isolate air and nitrogen to the ARV to close the valve. Off-site power is not lost if a fire occurs in area A-6, based on Calculation XX-E-013. However, normal lighting in the steam tunnel may be lost due to routing of the lighting cables in area A-6. Emergency lighting is provided in the steam tunnel but not in the area of the hatch opening. Operators should carry a flashlight if it becomes necessary to perform this action.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB20A, E-13AB20B, E-1F9101

5.2.2 Safety Injection and Containment Spray

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. A spurious containment spray actuation signal (CSAS) could cause the containment spray pumps to operate, depleting inventory in the RWST. These conditions are not desirable for PFSSD at Wolf Creek.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and

ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and, ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Containment spray (CS) is initiated automatically by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937.

Cables associated with steam line pressure transmitters ABPT0514, ABPT0516, ABPT0524, ABPT0534, ABPT0544 and ABPT0546 are run in area A-6. Cables associated with ABPT0514, ABPT0524, ABPT0534 and ABPT0544 are run in cable tray that has been wrapped with a 3-hour fire rated material. Therefore, there is reasonable assurance that these cables will be unaffected if a fire occurs in area A-6. Consequently, the two out of three logic for low steam line pressure initiation of SIS cannot be satisfied if a fire occurs in area A-6.

Based on the above discussion, a spurious SIS or CSAS is not credible if a fire occurs in area A-6.

References: E-15000, XX-E-013, E-1F9431, E-1F9432, E-1F9433, E-13AB21, E-13BB16, E-13EM01, E-13GN05

5.2.3 Steam Generator Main Steam Isolation Valves (MSIVs) and Bypass Valves

PFSSD requires the MSIVs and bypass valves be closed to prevent reactivity addition due to uncontrolled cooldown. The MSIVs and bypass valves are closed from the control room using all close hand switches ABHS0079 or ABHS0080. The bypass valves are normally closed.

Each MSIV is designed to utilize system fluid (main steam) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main steam. This is done by actuating either all close hand switch ABHS0079 (separation group 4) or ABHS0080 (separation group 1) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MSIV	ABHS0079 (Sep Group 4)		ABHS0080 (Sep Group 1)	
	Solenoids	Cable	Solenoids	Cable
ABHV0011	MV2, MV4, MV6	14ABK28BH	MV1, MV3, MV5	11ABK29BH
ABHV0014	MV2, MV4, MV6	14ABK29AH	MV1, MV3, MV5	11ABK28AH
ABHV0017	MV2, MV4, MV6	14ABK28AH	MV1, MV3, MV5	11ABK29AH
ABHV0020	MV2, MV4, MV6	14ABK29BH	MV1, MV3, MV5	11ABK28BH

All 8 cables associated with the 24 solenoid valves are run in area A-6. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 1 cables associated with hand switch ABHS0080 are run in tray that has been wrapped with a 3-hour fire rated material. The 3-hour fire wrap provides reasonable assurance that hand switch ABHS0080 will be available to close the four MSIVs.

Each MSIV bypass valve is normally closed and is required to remain closed for PFSSD. Two (2) redundant solenoid valves (one on each train) are installed on the air supply line and control air to the pneumatic actuator. The valves are normally closed with the solenoid valves

de-energized. Actuation of either hand switch will de-energize power to the solenoids to ensure they remain closed.

Cables associated with all 8 solenoids associated with the four bypass valves are run in area A-6. The four cables associated with separation group 1 (Train A) solenoids are run in tray that has been wrapped with a 3-hour fire rated material. The 3-hour fire wrap provides reasonable assurance that hand switch ABHS0080 will be available to close the four MSIV bypass valves if they are open at the time of the fire.

Based on the above discussion, hand switch ABHS0080 is available to close the MSIVs and bypass valves in the event of a fire in area A-6.

References: E-15000, XX-E-013, E-13AB23A, E-13AB23B, E-13AB26, E-13AB27, E-13AB28, E-13AB29, E-1F9101, M-12AB02

5.2.4 Steam Generator Main Feedwater Isolation Valves

PFSSD requires that either the main feedwater isolation valves (MFIVs) be closed or the main feedwater pumps be stopped to prevent overfilling the steam generators. Flow diversion from auxiliary feedwater (AFW) to the main feedwater system piping is prevented by check valves AEV0420, AEV0421, AEV0422 and AEV0423. Closure of the main feedwater isolation valves is not required to prevent AFW flow diversion.

Each MFIV is designed to utilize system fluid (feedwater) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main feedwater. This is done by actuating either all close hand switch AEHS0080 (separation group 1) or AEHS0081 (separation group 4) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MFIV	AEHS0080 (Sep Group 1)		AEHS0081 (Sep Group 4)	
	Solenoids	Cable	Solenoids	Cable
AEFV0039	MV1, MV3, MV5	11AEK16AH	MV2, MV4, MV6	14AEK17AH
AEFV0040	MV1, MV3, MV5	11AEK17AH	MV2, MV4, MV6	14AEK16AH
AEFV0041	MV1, MV3, MV5	11AEK16BH	MV2, MV4, MV6	14AEK17BH
AEFV0042	MV1, MV3, MV5	11AEK17BH	MV2, MV4, MV6	14AEK16BH

All 8 cables associated with the 24 solenoid valves are run in area A-6. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 1 cables associated with hand switch AEHS0080 are run in tray that has been wrapped with a 3-hour fire rated material. The 3-hour fire wrap provides reasonable assurance that hand switch AEHS0080 will be available to close the four MFIVs.

Based on the above discussion, MFIV isolation is assured using hand switch AEHS0080.

References: E-15000, XX-E-013, E-13AE14, E-13AE15, E-13AE16, E-13AE17, E-1F9201, M-12AE02

5.2.5 Auxiliary Feedwater

Several cables associated with both trains of auxiliary feedwater (AFW) are run in area A-6. Cables associated with Train A AFW components are run in cable tray (111J1L01 and 111U1K01) that has been wrapped with a 3-hour fire rated barrier. The 3-hour fire barrier provides reasonable assurance that the enclosed cables will be unaffected by a fire in area A-6.

Cables associated with Train B AFW components are not protected and could be damaged by the fire. Therefore, Train B AFW cannot be relied on to supply water to steam generators A and D.

One cable (12FCK23AX) associated with the TDAFP trip and throttle valve FCHV0312 and TDAFP speed governing valve FCFV0313 is run in area A-6. This cable is run in conduit with no other cables. Damage to the cable due to a fire could prevent operation of one or both valves. Therefore, the TDAFP may not be available to supply AFW to the steam generators if a fire occurs in area A-6.

Cables associated with two of the three CST pressure transmitters run in the area. The pressure transmitters (ALPT0037, ALPT0038 and ALPT0039) initiate swapover to ESW in the event the CST reaches low level. Low pressure on two out of three pressure transmitters initiates the swapover. Cable 11ALI08AA associated with ALPT0037 is run in tray that has been wrapped with a 3-hour fire rated material. The 3-hour fire wrap provides reasonable assurance that pressure transmitter ALPT0037 will not malfunction if a fire occurs in area A-6. Cables associated with ALPT0038 are not run in area A-6. Therefore, spurious AFW swapover to the ESW system will not occur.

Cables associated with Train A and Train B AFW pump room coolers SGF02A and SGF02B are run in area A-6. Damage to these cables will prevent operation of the associated cooler, which will prevent prolonged operation of the motor driven auxiliary feedwater pump. Cables associated with Train A AFP room cooler SGF02A are run in tray that has been wrapped with a 3-hour fire barrier. The 3-hour fire wrap provides reasonable assurance that the cables will be unaffected by a fire and that the cooler will be operable. Cables associated with SGF02B are not protected and may be damaged by a fire.

Based on the above discussion, the Train A AFW system is available to supply AFW to steam generators B and C.

References: E-15000, XX-E-013, M-12AL01, E-1F9204, E-13AL02A, E-13AL02B, E-13AL03A, E-13AL03BE-13AL05A, E-13AL05B, E-13AL07A, E-13AL07B, E-13AL08, E-13FC23, E-13FC24

5.2.6 Steam Generator Blowdown to Blowdown Flash Tank

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown. The valves are normally open air operated and are controlled by three solenoid valves. All three solenoid valves are required to be energized to open the valve. If any one solenoid is de-energized, the associated valve will close. Only two of the three solenoids for each valve are considered in the PFSSD analysis, so the third solenoid is assumed energized throughout the event. Cables run in area A-6 associated with these valves are listed in Table A-6-4.

A hot short within cables 14BMK06AA, 14BMK06BA, 14BMK06CA and 14BMK06DA will not cause the valves to spuriously open due to the absence of a +125 VDC source conductor. However, the cables are run in raceway that could contain other cables carrying 125 VDC that,

if an inter-cable hot short occurs, could spuriously open the valves and prevent them from being closed using hand switches BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A. Although this is unlikely due to the use of thermoset cables, it is postulated to occur for the purpose of this analysis.

Separation group 1 cables run in area A-6 associated with these blowdown valves are run in tray that has been wrapped with a 3-hour fire rated material. These cables are connected to a limit switch contact on each blowdown valve that is open when the valve is in its normally open position. With the limit switch contact open, the associated auxiliary relay is de-energized, which closes the seal-in contact on the solenoid valve associated with the handswitch on the BM157 panel in the Radwaste Building control room. With the seal-in contact closed, the associated solenoid valve remains energized. To de-energize the solenoid valve, the handswitch at the BM157 panel would have to be used. The 3-hour fire wrap provides reasonable assurance that these cables will be unaffected by the fire and that the handswitch at the BM157 panel will work.

Based on the above discussion, a fire in area A-6 will not prevent closing steam generator blowdown valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004.

Thermal hydraulic analysis WCNOC-CP-002 shows insignificant impact on SG inventory even with all four blowdown valves open. Therefore, no E-1F9900 OMA is required to close blowdown valves to achieve and maintain hot standby. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 34.

References: E-15000, XX-E-013, E-1F9101, E-13BM06A, E-13BM06C, E-13BM06D, M-12BM01

5.2.7 TDAFP Drain Trap Isolation Valve

Valve FCFV0310 is an isolation valve on the 1-inch steam trap line associated with the TDAFP. Solenoid valve FCFY0310 controls the position of valve FCFV0310. PFSSD requires this valve to be closed to prevent uncontrolled loss of steam through this flow path.

Cable 14FCK21AA is a control cable associated with valve FCFV0310. Inter or intra-cable hot shorts could cause the valve to spuriously open. There are no energized 125 VDC cables in the same conduit as cable 14FCK21AA, so inter-cable hot shorts causing the valve to open are not possible. An intra-cable hot short from conductor 2 to conductor 1 will energize the solenoid and open the valve. This can be mitigated by depressing the close pushbutton on hand switch FCHIS0310. However, since this is a momantary contact switch, the operator would have to maintain the the button in the depressed position.

Uncontrolled blowdown through this 1-inch line is bounded by the main steam line break analysis and loss of steam through this line will not result in uncontrolled cooldown. Therefore, if the valve remains open, PFSSD is assured.

References: E-15000, XX-E-013, E-13FC21, E-1F9202, M-12FC02

FIRE AREA A-7

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-7 is located on the 1974 elevation of the Auxiliary Building and includes the rooms listed in Table A-7-1.

Table A-7-1
Rooms Located in Fire Area A-7

ROOM #	DESCRIPTION
1126	Boron Injection Tank Room

Fire area A-7 is protected with automatic fire detection throughout. There is no automatic suppression installed in this area.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-7-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-7-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-7

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
EM	High Pressure Coolant Injection	R, M	BIT inlet valves EMHV8803A and EMHV8803B may be affected. Reactor coolant pump seal injection is available for boration and inventory control. For transition to cold shutdown, valve EMHV8803A or EMHV8803B may need to be manually opened to provide additional makeup, depending on the charging train being used.

Table A-7-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-7

System	System Name	PFSSD Function*	Comments
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.

Table A-7-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-7

System	System Name	PFSSD Function*	Comments
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.

Table A-7-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-7

System	System Name	PFSSD Function*	Comments
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-7.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-7. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 Boron Injection Tank Flowpath

It may be necessary to manually open EMHV8803A or EMHV8803B, or perform a cold shutdown repair to open the valves in order to establish a BIT flowpath. This action can be taken after the fire is out and the smoke has cleared the room.

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-7.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-7

PFSSD components (S. in E-15000) located in fire area A-7 are shown in Table A-7-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-7-3.

Table A-7-3
PFSSD Equipment Located in Fire Area A-7

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1126	EMHV8803A	Boron Injection Tank Inlet Valve	5.1.1	
1126	EMHV8803B	Boron Injection Tank Inlet Valve	5.1.1	

5.1.1 Boron Injection Tank Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

Normally closed boron injection tank (BIT) inlet valves EMHV8803A and EMHV8803B, and associated power and control cables, are located in fire area A-7. When charging through the BIT, the valve (EMHV8803A or EMHV8803B) on the operating charging train is required to be open. Damage to the valves and/or cables could prevent opening, or could cause the spurious opening, of the valves.

A fire in fire area A-7 will not cause a loss of seal injection or a loss of inventory. Therefore, the BIT flowpath is not required for boration and inventory control during hot standby. If the valves spuriously open, flow is prevented by maintaining BIT outlet valves EMHV8801A and EMHV8801B closed. BIT outlet valves EMHV8801A and EMHV8801B are unaffected by a fire in fire area A-7.

If a fire in this area requires the plant be taken to cold shutdown, it may be necessary to manually open EMHV8803A or EMHV8803B to establish a BIT flowpath. This action can be taken after the fire is out and the smoke has cleared the room.

Based on the above discussion, damage to valves EMHV8803A and/or EMHV8803B due to a fire in area A-7 will have no adverse impact on safe shutdown.

References E-15000, XX-E-013, E-13EM02, E-13EM02B, E-1F9302, M-12EM02

5.2 PFSSD CABLE EVALUATION

Table A-7-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-7. The applicable evaluation section is also listed in Table A-7-4.

Table A-7-4
PFSSD Cables Located in Fire Area A-7

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EMG02AA	1126	EMHV8803A	P	5.1.1	Train A BIT Inlet Valve
11EMG02AB	1126	EMHV8803A	C	5.1.1	Train A BIT Inlet Valve
14EMG02BA	1126	EMHV8803B	P	5.1.1	Train B BIT Inlet Valve
14EMG02BB	1126	EMHV8803B	C	5.1.1	Train B BIT Inlet Valve

FIRE AREA A-8

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-8 is located on the 2000 elevation of the Auxiliary Building and includes the rooms listed in Table A-8-1.

Table A-8-1
Rooms Located in Fire Area A-8

ROOM #	DESCRIPTION
1301	Corridor No. 1
1302	Filter Compartments
1306	Valve Compartments
1307	Corridor No. 2
1308	Valve Compartments
1311	Auxiliary Building Sampling Room
1312	Boron Meter and RC Activity Monitor Room
1313	Volume Control Tank Room
1314	Corridor No. 3
1315	Containment Spray Additive Tank Area
1318	Valve Compartment
1319	Demineralizer Compartments
1320	Corridor No. 4
1321	Exit Vestibule

An automatic pre-action sprinkler system is installed over concentrations of cable in cable trays. Automatic fire detection is installed throughout the area, except in rooms containing negligible quantities of combustible materials. The automatic suppression and detection system meets the intent of 10CFR50, Appendix R Section III.G.2.c.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-8-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-8-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-8

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Steam generators A and C ARVs may be affected. Steam generators B and D ARVs are unaffected but only Aux Feedwater Pump B may be available to supply steam generators A and D. Calculation WCNOC-CP-002 demonstrates the ability to maintain hot standby using only one steam generator. Hand switch ABHS0079 is available to close the MSIVs. Steam generator pressure indication is available using ABPI0515A, ABPI0516A, ABPI0525A, ABPI0535A, ABPI0545A and ABPI0546A. A spurious safety injection signal (SIS) due to low steam line pressure on two out of three steam line pressure transmitters can occur.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
AE	Main Feedwater	H, P	All PFSSD functions associated with the main feedwater system are satisfied. Isolate all four main feedwater isolation valves using hand switch AEHS0081. Steam generator A narrow range level indicators AELI0517, AELI0518, and AELI0519 are available. Steam Generator D wide range level indicator AELI0504 and Steam Generator D narrow range level indicators AELI0547, AELI0548, and AELI0549 are available.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. Train B MDAFP is available to supply S/Gs A and D. ALFT0007 and ALFT0001 are available to provide auxiliary feedwater flow indication from MDAFP B to SGs A and D, respectively. Condensate Storage Tank (CST) pressure indication is available using pressure transmitters/indicators ALPT0038/ALPI0038A and ALPT0039/ALPI0039A.
AP	Condensate Storage System	H	The condensate storage tank is available to supply water to Train B MDAFP.

Table A-8-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-8

System	System Name	PFSSD Function*	Comments
BB	Reactor Coolant System	R, M, H, P, S	RCP thermal barrier cooling could be affected due to spurious closure of BBHV0013, BBHV0014, BBHV0015 and BBHV0016. RCP seal injection is available but the charging flowpath from the RWST to the RCP seals may need to be lined up from the control room. Pressurizer level indication is available using BBLI0460A. RCS Loop 1 Wide Range Cold Leg Temperature Element BBTE413B and RCS Loop 4 Wide Range Hot Leg Temperature Element BBTE443A are available. RCS pressure indication is available using BBPI0406 on RL002. Pressurizer pressure indication is available using BBPI0456, BBPI0457 and BBPI0458 on RL002. Pressurizer PORV BBPCV0455A may open and block valve BBHV8000A may not close. The PORV can be closed by placing BBHIS0455A in the Close position. During hot standby, maintain the RCS to RHR flow path valves BBPV8702A and BBPV8702B closed by ensuring hand indicating switches BBHIS8702A and BBHIS8702B are in the closed position. Some open permissives may be affected by the fire. Loss of inventory through the head vent valves is prevented by maintaining valves BBHV8002A and either BBHV8001B or BBHV8002B closed. For cold shutdown, it may be necessary to manually open BBPV8702B when operating Train B RHR.
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. Train B Centrifugal Charging Pump (CCP) is available to provide charging flow from the RWST to the RCP seals. Isolate the VCT using both hand switches BGHIS0112B and BGHIS0112C to close valves BGLCV0112B and/or C. Valves BGHV8153A and either BGHV8153B or BGHV8154B are maintained closed to isolate excess letdown. BGHV8105 is available to isolate normal charging using BGHIS8105. Letdown isolation valves BGLCV0459 and BGLCV0460 and letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C may not respond to a close signal from the control room. Valve BGLCV0460 will automatically close when pressurizer level reaches 17%. VCT level indication is available using BGLI0185. Level indicator BGLI0112 could be affected. RCP seal flow indication is available using BGFI0215B. RCP seal flow indicator BGFI0215A may be affected.

Table A-8-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-8

System	System Name	PFSSD Function*	Comments
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blowdown system are satisfied. Steam generator blowdown is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A, located on the RL024 panel in the main control room.
BN	Borated Refueling Water Storage System	R, M, H	The RWST is available to provide a suction source to Centrifugal Charging Pump B via valve BNLCV0112E. RWST to RHR suction valve BNHV8812A could spuriously close. If this occurs coincident with a SIS, the Train A RHR pump would be damaged. RWST to RHR suction valve BNHV8812B will not spuriously close as the BNHV8812B control circuit is protected with fire resistive cable 14BNG03BK in fire area A-8.
EF	Essential Service Water System	H, S	All PFSSD functions associated with the Essential Service Water (ESW) system are satisfied. Train B ESW is available to supply cooling water to Auxiliary Feedwater Pump room cooler SGF02B, Train B Component Cooling Water (CCW) Heat Exchanger, CCW B pump room cooler SGL11B, CCP B room cooler SGL12B, RHR B room cooler SGL10B, and Containment Air Coolers SGN01B and SGN01D.
EG	Component Cooling Water System	S	All PFSSD functions associated with the Component Cooling Water (CCW) system are satisfied. Train B CCW is available to provide cooling water to the RHR B heat exchanger, the CCP B oil cooler, the seal water heat exchanger and the RHR pump B seal cooler. Either CCW pumps PEG01B or PEG01D are available. Valve EGHV0015 may not close when swapping to Train B CCW. This is acceptable based on Calculation M-EG-24. CCW flow to all four RCP thermal barriers could be affected as discussed in the BB System comments. CCW to RCP flow indicators EGFI0128 and EGFI0129 could be affected. Valve EGHV0101 could be affected. Valve EGHV0102 is unaffected.
EJ	Residual Heat Removal System	M, H, P	Train A RHR could be affected by a spurious SIS coincident with damage to EJFIS0610 or spurious closure of BNHV8812A, which could cause the Train A RHR pump to start and overheat. Train B RHR system is unaffected by this scenario because EJFIS0611 and BNHV8812B are unaffected by a fire in area A-8. RHR Train B discharge valves EJHCV0607 and EJHV8809B are available. RCS to RHR isolation valve EJHV8701B may have to be manually opened for cold shutdown when operating RHR Train B. Valve EJHV8809A could be affected but valve EJHV8809B is unaffected. RHR system flow diagnostic instrumentation is available using various available temperature indicators.

Table A-8-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-8

System	System Name	PFSSD Function*	Comments
EM	High Pressure Coolant Injection	R, M	A spurious SIS due to two out of three low steamline pressures can occur. The spurious SIS can be terminated by entering EMG E-0. Boron injection tank (BIT) isolation valves EMHV8801A, EMHV8803A and EMHV8803B could be affected. Reactor coolant pump seal injection is available for boration and inventory control. For transition to cold shutdown, valve EMHV8803B may need to be manually opened to provide additional makeup using Train B CCP.
EN	Containment Spray	R, M	Train A containment spray isolation valve ENHV0006 could spuriously open. A spurious CSAS is not credible for a fire in this area and the Train A containment spray pump will not spuriously start. Therefore, spurious opening of ENHV0006 will not result in an actual containment spray.
EP	Safety Injection Accumulators	H	A containment entry may be required to close SI Accumulator injection valves EPHV8808A and EPHV8808C if these valves are unresponsive from the control room. The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
FC	Auxiliary Turbines	R, H, P	The Turbine Driven Auxiliary Feedwater Pump is not available for a fire in area A-8. One cable associated with FCHV0312 and FCHV0313 runs in this area and could cause the valves to close, isolating steam supply to the TDAFP.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
GF	AFW Pump Room Coolers	S	AFW Pump B room cooler is unaffected by a fire in area A-8.
GK	Control Room and Class 1E Switchgear Room Coolers	S	Train B Class 1E switchgear room cooler SGK05B is available.
GL	Auxiliary Building HVAC	S	Train B Auxiliary Building HVAC is available.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.

Table A-8-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-8

System	System Name	PFSSD Function*	Comments
GN	Containment Coolers	S	Train A Containment Air Coolers SGN01A and SGN01C may be affected. Train B Containment Air Coolers SGN01B and SGN01D are available. Containment pressure indicators GNPI0934, GNPI0935 and GNPI0936 are available.
JE	Diesel Fuel Oil	S	The Train A EDG Fuel Oil Transfer Pump PJE01A could be affected. The Train B EDG Fuel Oil Transfer Pump PJE01B is unaffected.
KA	Instrument Air	S	Valve KAFV0029 could be affected by a fire in this area. This will have no adverse impact on PFSSD.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
NB	4.16 kV System	S	The PFSSD Support function associated with the 4.16 kV system is satisfied. Offsite and onsite power to NB02 is unaffected. Offsite and onsite power to NB01 could be lost.
NE	Standby Diesel Generator	S	The Train A EDG may not be available. The Train B EDG is unaffected.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
NG	480V Load Centers and MCCs	S	Train B MCCs NG02B, NG02T and NG04T are not affected by a fire in area A-8.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
PA	13.8kV	S	Breakers PA0105, PA0106 and PA0206 could be affected by a fire in area A-8. Redundant capability is available.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.

Table A-8-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-8

System	System Name	PFSSD Function*	Comments
PG	480V Load Centers and MCCs	S	Load centers PG11, PG12, PG13 and PG19 may be lost. Redundant capability is unaffected.
PK	125VDC	S	Battery charger PK22 may be lost. Redundant power feed to the PK02 bus is available from 125 VDC battery group PK12. Class 1E 480 VAC power to inverter PK24 could be disrupted. Battery rack PK14 is unaffected and is available to supply short-term 125 VDC power to bus PK04.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
PN	120VAC	S	The normal and alternate power feeds to PN07 are affected. PN08 remains available to supply power to its respective PFSSD loads.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
RP	Miscellaneous Control Panels	R, M, H, P, S	Auxiliary relay rack RP209 may be lost. Redundant relay rack RP210 is available.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
SB	Reactor Protection System	R, S	SB102A may be lost. SB102B is unaffected.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
SE	Ex-Core Neutron Monitoring	R, P	Source range monitoring is available for a fire in area A-8 using SR monitors SENE0031, SENE0032, and SENY061A/B.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-8.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-8. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are generally described in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator Atmospheric Relief Valves

A fire in the North corridor (Rooms 1301 and 1320) can cause the spurious operation or maloperation of steam generator ARVs ABPV0001 and/or ABPV0003. The Train A Motor Driven Auxiliary Feedwater Pump (MDAFP) and the Turbine Driven Auxiliary Feedwater Pump may be affected by the fire. The Train B MDAFP is available to supply steam generators A and D. Calculation WCNOC-CP-002 shows that no manual operator actions outside the control room are required in this case. Operators should continue operating the Train B MDAFP and supply auxiliary feedwater to steam generators A and D and operate ARV ABPV0004 as necessary.

If it is desired to close the failed ARVs, Operators can close ABPV0001 by isolating air and nitrogen to the valve using KAV1435 (air) and KAV1364 (nitrogen) then venting air from the regulator. Operators can close ABPV0003 using local controller ABFHC0003. These components are located in fire area A-23 and emergency lighting is available.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Pressurizer PORV/Block Valve

Pressurizer PORV BBPCV0455A could spuriously open and block valve BBHV8000A may not close. If this occurs, operators can close the PORV by placing BBHIS0455A in the CLOSE position. Pressurizer pressure indication is available using BBPI0456, BBPI0457 and BBPI0458 located on RL002.

3.2.2 Main Steam Isolation Valves (MSIVs) and MSIV Bypass Valves

Cables for hand switch ABHS0080 may be damaged by the fire. Cables for redundant hand switch ABHS0079 are unaffected. Use ABHS0079 to close the MSIVs and MSIV bypass valves.

3.2.3 Main Feedwater Isolation Valves (MFIVs)

Cables for hand switch AEHS0080 may be damaged. Cables for redundant hand switch AEHS0081 are unaffected. Use AEHS0081 to close the MFIVs.

3.2.4 RWST to Charging Pump B Suction

Cables associated with valve BNLCV0112D may be damaged by the fire. Automatic swapover due to low-low level in the VCT will occur since BGLT0185 is protected. If one or both VCT outlet valves close without the VCT being at the low-low level setpoint, automatic swapover will

not occur. In this case operators can open BNLCV0112E using BNHIS0112E on RL001 to provide a suction path from the RWST to Train B CCP.

3.2.5 Charging to Regenerative Heat Exchanger

A fire in area A-8 could prevent closure of valve BGHV8106 using BGHIS8106. Valve BGHV8105 can be closed using BGHIS8105 located on RL001 in the main control room.

3.2.6 Spurious SI

If a fire-induced spurious SI signal is received, enter EMG E-0 and terminate the SI. Pump PBG05B should be stopped immediately using hand switch BGHIS0002A because of the possibility of hydrogen gas binding. The pump can be re-started after action 3.1.3 is completed. Indication of Train A and Train B SI pump operation is available using the indicating lights on EMHIS0004 (Train A pump) and EMHIS0005 (Train B pump).

3.2.7 Component Cooling Water

Train A CCW could be affected by a fire in this area. If this occurs, swap to Train B CCW using normal operating procedures if Train B CCW is not already running.

3.2.8 Reactor Coolant Pump Seal Cooling

Thermal barrier cooling could be affected due to spurious closure of BBHV0013, BBHV0014, BBHV0015 and/or BBHV0016. RCP seal injection could temporarily be disrupted until the Train B CCP is lined up. To restore RCP seal injection, operators should line up the Train B CCP after isolating the VCT. Operators should closely monitor RCP seal total flow indicator BGFI0215B and take prompt action to restore seal injection if flow is lost.

3.2.9 Volume Control Tank (VCT) Isolation

To ensure VCT isolation, close both VCT isolation valves BGLCV0112B and BGLCV0112C using hand switches BGHIS0112B and BGLCV0112C in the control room. This action ensures at least one valve will close. VCT level indication is available using BGLI0185.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR

If operating the Train A RHR system for cold shutdown, it may be necessary to manually align EJHCV0606 due to possible damage to the associated circuits. Train B RHR discharge valve EJHCV0607 is unaffected by a fire in area A-8.

Depending on the RHR Train used for shutdown cooling, either valves BBPV8702A and EJHV8701A or valves BBPV8702B and EJHV8701B may need to be manually opened, or a cold shutdown repair made, when initiating RHR for cold shutdown.

3.3.2 SI Accumulators

A fire in area A-8 may require a containment entry to close SI Accumulator injection valves EPHV8808A and EPHV8808C if these valves are unresponsive from the control room. The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig.

3.3.3 Steam Generator Atmospheric Relief Valves

In order to regain control of ARV ABPV0001 in the control room, it may be necessary to perform a cold shutdown repair. This action will mitigate a spurious hot short on cable

11ABI20EC and transfer control back to ABPIC0001A. It may also be necessary to re-open air and nitrogen supply to the ARV by re-opening KAV1435 (air) and KAV1364 (nitrogen), if these valves were previously closed.

3.3.4 Boron Injection Tank Flowpath

It may be necessary to manually open EMHV8803B in order to establish a BIT flowpath using Train B CCP.

4.0 CONCLUSION

With some exceptions, redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-8.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-8

PFSSD components (S. in E-15000) located in fire area A-8 are shown in Table A-8-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-8-3.

Table A-8-3
PFSSD Equipment Located in Fire Area A-8

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1301	EJFIS0610	RHR Pump A Mini Flow Indicating Switch	5.1.1	
1301	TB13209	Terminal Box Valve EMHV8801A Control Circuit	5.2.22	
1302	BGV0101	Seal Water Injection Filter A Inlet Iso	5.1.9	
1302	BGV0105	Seal Water Injection Filter B Inlet Iso	5.1.9	
1314	PG19	480V Non-Class 1E Load Center	5.1.2	
1314	PG1900	480V Non-Class 1E LC Feeder From PG1500	5.1.2	
1314	PG1901	480V Non-Class 1E Load Center Incoming Fdr	5.1.2	
1314	PG1907	480V Non-Class 1E Auxiliary Bldg MCC (PG19G)	5.1.2	
1314	XPG19	480V Non-Class 1E LC Xfmr - Auxiliary Bldg	5.1.2	
1318	BGLCV0112B	VCT Iso Vlv From Charging Pump Suction Valve	5.1.3	
1318	BGLCV0112C	VCT Iso Vlv From Charging Pump Suction Valve	5.1.3	
1318	BGLT0112	VCT Level Transmitter	5.1.4	
1320	BBPT0405	Reactor Coolant Sys Press Wide Range Hot Leg	5.1.5	
1320	RP209	Auxiliary Relay Rack	5.1.6	
1320	RP330	Reverse Isolation Relay Rack	5.1.7	
1320	RP332	Auxiliary Relay Rack	5.1.8	
1320	TB13402	Terminal Box	5.1.5	TB associated with BBPT0405
1320	EGFT0128	CCW to RCPs Flow Transmitter	5.2.19	
1320	EGFT0129	CCW to RCPs Flow Transmitter	5.2.19	

5.1.1 RHR Pumps A and B Mini-Flow

The RHR pump mini-flow path is required when the RHR system is operating to prevent damage to the RHR pump during low-flow in the RHR system. The RHR mini-flow path consists of the mini-flow valve, flow indicating switch, pipe and fittings. With flow at or below the desired setting, the flow indicating switch low-flow contacts close, sending an open signal to the mini-flow valve and thus allowing re-circulating flow through the mini-flow path. When flow exceeds the desired setting, the flow indicating switch high-flow contacts close, sending a close signal to the mini-flow valve and thus preventing re-circulating flow through the mini-flow path.

Mini-flow indicating switch EJFIS0610 and control cable associated with Train A RHR mini flow valve EJFCV0610 is located in Fire Area A-8 (Room 1301). Power and control cables associated with Train A mini-flow valve EJFCV0610 are located in Fire Area A-8. Damage to the switches or cables could prevent the Train A RHR mini-flow sub-system from performing its intended function. The Train B RHR mini-flow sub-system is unaffected by a fire in this area.

Based on the above discussion, damage to the Train A RHR mini-flow indicating switch, valve and/or associated circuits will not prevent the safe shutdown of the plant after a fire. The Train B RHR mini-flow system is unaffected by a fire in area A-8.

References: E-15000, XX-E-013, E-13EJ08, E-1F9205, E-1R1313B, E-1R1323A, M-12EJ01, CR 25002, CP 13615

5.1.2 480V Non-Class 1E Electrical Distribution (PG19)

480V Non-Class 1E load center (PG19) supplies power to Motor Control Center (MCC) PG19G, which supplies power to the following PFSSD loads:

1. MCB Misc. Power Circuits (RL023)
2. Instrument Bus Transformer - Alt. Feed (XPN07D)

Several cables associated with PG19 are run in this area. Damage to these cables could disrupt power to PG19 and associated PFSSD equipment. The following paragraphs discuss the PFSSD impact on loss of PG19.

Load center PG19 transformer XPG19 steps 13.8kV down to 480 VAC prior to entering PG19. A fire in area A-8 could result in a loss of PG19 and associated PFSSD loads.

Loss of power to PG19 will cause a loss of power to PG19GCR217, which supplies MCB RL023/RL024 miscellaneous circuits. Several loads are supplied by this power supply, but only seven are PFSSD components. These are ABLV0051, ABLV0053, ABFV0023, ABFV0025, ABFV0027, ABFV0029 and ABHIS0032 which are components downstream of the Main Steam Isolation Valves (MSIVs). Loss of power to ABLV0051, ABLV0053, ABFV0023, ABFV0025, ABFV0027 and ABFV0029 will fail the valves open, which is not desired for PFSSD. Loss of power to ABHIS0032 will cause a loss of hand switch indicator lights. However, as described in Section 5.2, a fire in area A-8 does not affect the ability to close the MSIVs and MSIV bypass valves using hand switch ABHS0079 in the main control room. Therefore, the MSIV downstream components can fail in an undesired position without any consequence on PFSSD.

Loss of power to PG19 will cause a loss of power to PG19GFR3, which supplies power to XPN07D (Instrument Bus Transformer - Alt. Feed to PN07). The normal source of power to PN07 is from XPN07A. Cable 11PNG01AE runs from NG001BEF4 to NG001ABF1, through area A-8. Damage to this cable could cause a loss of power to XPN07A. Therefore, both the normal and alternate power feeds to PN07 could be lost if a fire occurs in area A-8.

The PFSSD function of panel PN07 is to supply power from PN0736 to Train A RHR Heat Exchanger Discharge Control Valve EJHCV0606 via RL017/RL018. Panel PN07 also supplies power from PN0738 to temperature recorder BBTR0423 via RL021/RL022. Loss of power to PN07 will disrupt power to these PFSSD components.

Panel PN08 is unaffected by a fire in area A-8 and is available to supply power to redundant Train B components. Therefore, loss of power to PN07 will have no adverse impact on PFSSD.

Valve EJHCV0606 is a normally open/fail open valve, so loss of power will fail the valve in the open position, which is the desired PFSSD state. In the event that EJHCV0606 control is lost, redundant Train B RHR heat exchanger discharge control valve EJHCV0607 is available and is unaffected by a fire in area A-8. In addition, a cold shutdown repair or manual action can be performed to restore the required valve to its desired position.

Based on the above discussion, loss of load center PG19 will have no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-11PG05, E-11PK01, E-13EJ12, E-13PG02, E-13PG13, E-13PN01, E-13PN01A, E-13RL04, E-1F9421, E-1F9422C, E-1F9424E, E-1R1321, M-12EJ01

5.1.3 Volume Control Tank (VCT) Outlet Valves to Charging Pumps

The reactivity control and reactor coolant makeup functions of PFSSD require charging flow to the RCP seals taking suction from the Refueling Water Storage Tank (RWST). To ensure adequate suction pressure to the operating charging pump, either VCT outlet valve BGLCV0112B or BGLCV0112C needs to be closed. This will prevent hydrogen cover gas intrusion into the suction of the charging pump and prevent possible cavitation and failure of the pump. However, the valves need to remain open as long as the VCT is the only suction source to the charging pump. Inadvertent closure of either valve can cause damage to the operating charging pump.

The VCT provides surge protection and a suction source to the Chemical and Volume Control System (CVCS). Hydrogen cover gas is used in the VCT at a pressure of 30 – 35 psig to scavenge oxygen from the water. If the VCT remains the suction source for charging with insufficient or no makeup to the VCT, (see sections 5.1.4 and 5.2.21 for discussions on the VCT level transmitters and the normal letdown valves) the VCT could empty and H_2 could be introduced into the charging pump suction. This will damage the operating charging pump and make it inoperable. Inadvertent closure of either VCT outlet valve with no alternate suction source will damage the operating charging pump due to inadequate suction head. Assumption 3-A-22 in Calculation XX-E-013 states: “Systems and components are in their normal operating position or status prior to the fire....” The Normal Charging Pump is the normally operated pump in the CVCS. Therefore, if either VCT outlet valve inadvertently closes due to the fire, or the valves remain open such that Hydrogen is introduced into the charging pump suction header, both Trains of Centrifugal Charging Pumps (CCPs) will remain available, provided the fire does not cause damage to circuits associated with the CCPs. However, since the power cables for the NCP pass through fire area A-8 the NCP could trip. If this occurs, operations would not start another charging pump until suction lineup from the RWST has been confirmed.

Both VCT outlet valves (BGLCV0112B and BGLCV0112C) are located in fire area A-8 (Room 1318) within a few feet of each other. Power and control cables associated with BGLCV0112B are run in rooms 1301, 1313 and 1318. Power and control cables associated with BGLCV0112C are run in rooms 1318 and 1320. Cables for BGLCV0112C located in room 1320 are wrapped with a 1-hour fire rated material which will prevent damage to the cables in

the event of a fire in room 1320. Damage to cables in the remaining rooms could prevent closure of either valve and, in the absence of makeup to the VCT, could cause draindown of the VCT and possible hydrogen intrusion into the pump suction.

License Amendment 205 was issued on August 23, 2013 and approves the configuration of the VCT outlet valves, given the fire protection features present in fire area A-8. The fire protection features provide reasonable assurance that at least one VCT outlet valve will close upon a signal from the control room hand switches. Level indication is available in the control room using BGLI0185, which is protected from a fire in area A-8. Indication of a fire in area A-8 along with a reducing level in the VCT would prompt operators to isolate the VCT by actuating both hand switches BGHIS0112B and BGHIS0112C. These actions provide reasonable assurance that at least one VCT outlet valve will close and prevent hydrogen from entering the charging pump suction.

Based on the above discussion, a fire in area A-8 will not impact the ability to isolate VCT to charging pumps. If one of the VCT valves spuriously closes prior to lining up the RWST supply, then the Normal Charging Pump could be damaged due to loss of suction, but the train B CCP will be available.

References: E-15000, XX-E-013, M-12BG03, E-13BG12, E-13BG12A, E-1F9102, E-1F9302, E-1R1321, E-1R1323B, E-1R1323D, E-1R1323E, E-1R1343B, E-1R1908, License Amendment 205

5.1.4 VCT Level Indication

Volume Control Tank (VCT) level transmitter BGLT0112 is included in the PFSSD design because it initiates refueling water sequence upon sensing low-low water level in the VCT. The transmitter also provides VCT level indication in the control room. BGLT0112 uses sealed capillary tubing as instrument lines. Sealed capillary tubing can be affected by the heat generated by a fire. Therefore, the instrument tubing for this instrument is also considered to be damaged by a fire.

Damage to the VCT level transmitter, the instrument tubing or associated circuits could cause one or more of the following to occur:

1. Loss of VCT level indication in the Control Room
2. False low-low level in the VCT, initiating swap-over to the RWST
3. Inability to sense low-low level in the VCT, resulting in a loss of suction to the CCPs.

Redundant VCT level transmitter BGLT0185 is located in a separate fire area and is unaffected by a fire in area A-8. However, cable 14BGI51DA is located in fire area A-8 but has been protected with a 1-hour fire rated electrical raceway fire barrier system (ERFBS). The ERFBS along with automatic fire suppression and detection provides reasonable assurance that the cable will be unaffected by a fire in area A-8 and meets Wolf Creek commitments to 10 CFR 50, Appendix R. Therefore, VCT level indication remains available in the event of a fire in this area.

A sporadic low-low VCT level signal caused by damage to BGLT0112 and/or associated cable will start the RWST sequence, which is the desired PFSSD lineup. Therefore, this will not prevent PFSSD in the event of a fire in this area.

If transmitter BGLT0112 and associated cable is damaged, redundant VCT level transmitter BGLT0185 remains available to initiate RWST sequence upon low-low level in the VCT.

Based on the above discussion, damage to BGLT0112 and/or associated circuits will not prevent safe shutdown in the event of a fire in area A-8.

References: E-15000, XX-E-013, E-13BG12, E-13BG12A, E-13BG51, E-1F9102, E-1F9302, E-1R1323B, E-1R1323D, E-1R1323E, M-12BG03

5.1.5 Reactor Coolant System (RCS) Pressure Indication

The PFSSD design requires RCS pressure indication to be available. RCS pressure indication is provided in the control room using BBPI0405 or BBPI0406 on RL022. Pressure transmitter BBPT0405 is located in fire area A-8 (Room 1320) and could be damaged by a fire in this area. Cables associated with BBPT0405 (11BBI15EA and 11BBI15EB) are also run through fire area A-8 and could be damaged by a fire.

Redundant RCS pressure transmitter BBPT0406 is located in Fire Area A-1 (Room 1202) and is unaffected by a fire in area A-8. Cables associated with BBPT0406 do not run through area A-8. Therefore, RCS pressure indication is available if a fire occurs in area A-8 using BBPI0406.

Based on the above discussion, RCS pressure indication is available in the control room using BBPI0406 if a fire occurs in area A-8.

References: E-15000, XX-E-013, E-13BB15, E-13BB16, E-1F9201, E-1R1343A, M-12BB04

5.1.6 Auxiliary Relay Rack RP209

Auxiliary relay rack RP209 is located in Fire Area A-8 (Room 1320) and houses the following PFSSD relays:

1. 3XBM13 - Steam Generator Blowdown to Blowdown Flash Tank Isolation Valve BMHV0001
2. 3XBM14 - Steam Generator Blowdown to Blowdown Flash Tank Isolation Valve BMHV0002
3. 3XBM15 - Steam Generator Blowdown to Blowdown Flash Tank Isolation Valve BMHV0003
4. 3XBM16 - Steam Generator Blowdown to Blowdown Flash Tank Isolation Valve BMHV0004
5. 94XAB5 - MSIV Bypass Valve Auxiliary Relay

Redundant relay rack RP210 is located in a different fire area (A-16) and is unaffected by a fire in area A-8.

Power to RP209 is supplied from NK5113 via cable 11RPK09CA. This cable (11RPK09CA) runs through area A-8 and could be damaged by a fire, resulting in a loss of power to RP209. Loss of power to the relays will result in a fail closed position on the associated valves, which is the desired PFSSD position.

Auxiliary relays 3XBM13, 3XBM14, 3XBM15 and 3XBM16 are associated with one of the three solenoid circuits. These relays are part of the seal-in circuit that closes the seal-in contact when the BMHV valve is open (relay de-energized) and opens the seal-in contact when the BMHV valve is closed (relay energized). In order to re-open the BMHV valves, an operator needs to operate the associated hand indicating switch on the BM157 panel, provided the remaining two solenoids are energized. Damage or loss of power to these relays will not prevent safe shutdown due to redundant panel RP210 located in a different fire area.

Auxiliary relay 94XAB5 is associated with the separation group 1 MSIV bypass valve circuit. With the auxiliary relay energized, one of the two solenoid valves associated with each MSIV bypass valve is energized. With the auxiliary relay de-energized, the solenoid valve is de-

energized and the bypass valve closes. Damage or loss of power to this relay will not prevent safe shutdown due to redundant panel RP210 located in a different fire area.

Cables associated with the steam generator blowdown valves and the MSIV bypass valves are listed in Table A-8-4 and are evaluated in this section.

PFSSD requires that the MSIV bypass valves be closed to control cooldown. Cables 11ABK23AA, 11ABK23AB, 11ABK23AC, 11ABK23AD, 11ABK23AF and 11ABK23AG are associated with MSIV bypass valves ABHV0012, ABHV0015, ABHV0018 and ABHV0021. The bypass valves are normally closed, which is the desired PFSSD position. In order for the valves to spuriously open, both solenoids on the air line need to be energized. An external cable hot short on cables 11ABK23AA, 11ABK23AB, 11ABK23AC, 11ABK23AD or 11ABK23AG could energize one or more of the solenoids but the Train B solenoids are unaffected by a fire in area A-8. In addition, hand switch ABHS0079 is available to ensure the bypass valves are closed. Therefore, a fire in area A-8 will not affect the ability to isolate the MSIV bypass valves.

Cable 11ABK23AE is associated with steam line isolation signal relay K627. Upon receipt of a steam line isolation signal, the relay contact opens and the bypass valves close. An open circuit in one of the two conductors will produce the same result as a steam line isolation signal, which is desired for PFSSD. A hot short between the conductors will bypass the contact and prevent a steam line isolation signal from closing the valves. As stated earlier, redundant means are available to ensure the MSIV bypass valves are closed using separation group 4 solenoid valves and fast-close hand switch ABHS0079.

An open or hot short on cables 11BMK06EA, 11BMK06FA, 11BMK06GA or 11BMK06HA will have no adverse effect on the BMHV valves.

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown. Cables 15BMK06AB, 15BMK06AC, 15BMK06BB, 15BMK06BC, 15BMK06CB, 15BMK06CC, 15BMK06DB and 15BMK06DC are associated with the BM157 panel mounted hand switches for each of the BMHV valves. Cable 15BMK16AA is a DC power feed for BM157. Damage to these cables could impact the ability to close the valves from BM157 in the Radwaste Control Room. However, the normal means of closing these valves using the RL024 mounted hand switches in the Main Control Room remains available. Therefore, a fire in area A-8 will not prevent the closure of valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004.

Based on the above discussion, a fire in area A-8 that damages RP209 and associated PFSSD relays and cables will not prevent safe shutdown of the plant due to the availability of redundant capability located in a different fire area.

References: E-15000, XX-E-013, E-093-00048, E-093-00026, E-13AB23A, E-13AB23B, E-13AB26, E-13BM06A, E-13BM06C, E-13BM06D, E-13RP09, E-1F9101, M-12AB02, M-12BM01

5.1.7 Reverse Isolation Relay Rack RP330

Relay rack RP330 houses PFSSD relays 3XEG20 and 95XGK07. Other relays located in this panel are not credited in the PFSSD design except that relays 27XQB1 and 27XQB2 are associated with the control room emergency lights are evaluated in Section 5.2.27.

Relay 3XEG20 is associated with Train A CCW heat exchanger temperature control valve EGTV0029. EGTV0029 is an air operated valve using solenoid valve EGTY0029A to control air flow into the valve. With solenoid valve EGTY0029A energized (normal state), valve

EGTV0029 is automatically modulated to maintain required CCW heat exchanger outlet temperature. Loss of power to the solenoid will fail valve EGTV0029 closed, which is the desired PFSSD position.

Cables 11EGK16AA and 11EGK16AC are associated with valve EGTV0029. Damage to either of these cables will close the valve or allow it to modulate. Both scenarios are acceptable for PFSSD.

Cable 15RPK09NA is the power cable from PK5126 to separation group 5 relays in RP330 and runs through fire area A-8. Damage to this cable could cause a loss of power to relay 95XGK07 and shut down SGK05A.

Relay 95XGK07 is the fire signal isolation relay for Class 1E Electrical Equipment A/C unit SGK05A. This relay controls automatic shutdown of SGK05A prior to Halon actuation in the event of a fire in the Train A Class 1E switchgear rooms (Rooms 3301, 3408 and 3414). Damage to this relay could cause the SGK05A A/C unit to shut down.

Cables 11GKG13AE and 11GKG13AF are control cables for SGK05A and run to relay panel RP330 in area A-8. Damage to these cables could prevent automatic operation of SGK05A.

Cable 15GKK31CA is a control cable for fire signal isolation of SGK05A and runs to panel RP330 in area A-8. An open in cable 15GKK31CA will initiate a false fire isolation signal and shut down SGK05A.

Redundant Train B relay rack RP331 is located in fire area A-16 and is unaffected by a fire in area A-8. Relay rack RP331 houses relay 3XEG08 associated with the Train B CCW heat exchanger temperature control valve EGTV0030. Cables associated with valve EGTV0030 are not run in fire area A-8. Therefore, Train B CCW heat exchanger temperature control valve EGTV0030 is unaffected by a fire in area A-8.

Relay rack RP331 also houses relay 95XGK08 associated with the Train B Class 1E Electrical Equipment A/C unit SGK05B. Cables associated with SGK05B are not run in area A-8. Therefore, SGK05B will remain available to supply cooling to the Train B Class 1E electrical equipment.

Based on the above discussion, a fire in area A-8 that damages RP330 and associated PFSSD relays and cables will not prevent safe shutdown of the plant due to the availability of redundant capability located in a different fire area.

References: E-15000, XX-E-013, E-096-00064, E-13EG16, E-13GK13, E-13GK13A, E-13GK31, E-1F9401A, E-1F9444, E-1R1343B, M-12EG02

5.1.8 Auxiliary Relay Rack RP332

RP332 is an Auxiliary Relay Rack located in area A-8 room 1320. This relay rack houses PFSSD relay 62TDENB01, Degraded Voltage Trip Block Relay. PFSSD requires that either this relay or relay K617 in panel SB029C be available to ensure off-site power is available to NB01. Panel SB029C is located in fire area C-27 (room 3605) and is unaffected by a fire in area A-16.

Cable 11NBB12AD is a control cable that runs from NB0112 to RP332 and provides control power to relay 62TDENB01. This cable runs through area A-8 and could be damaged by a fire. Damage to this cable could cause a spurious degraded voltage signal which could result in a loss of off-site power to bus NB01.

Based on Calculation XX-E-013, Appendix 2, off-site power is available using NB02 for a fire in area A-8. Therefore, loss of off-site power to NB01 will not impact the ability to achieve and maintain PFSSD.

References: E-15000, XX-E-013, E-1F9425, E-13NB12

5.1.9 RCP Seal Injection

Valves BGV0101 and BGV0105 are manual valves used to isolate RCP seal injection. At least one of these valves is normally open and will remain open in the event of a fire. There are no electrical cables or components associated with these valves. The valves were added to the PFSSD component list in change package 12081 to provide a reliable means to isolate seal injection in the event of a fire in the control room and subsequent shutdown per OFN RP-017.

References: E-15000, XX-E-013, CCP 12081, OFN RP-017, E-1F9303, M-12BG03

5.2 PFSSD CABLE EVALUATION

Table A-8-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-8. The applicable evaluation section is also listed in Table A-8-4.

Table A-8-4
PFSSD Cables Located in Fire Area A-8

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ABI20EA	1301, 1320	ABPT0001	I	5.2.1	ARV ABPV0001 Pressure Transmitter
11ABI20EC	1301, 1320	ABPV0001	I	5.2.1	ARV Press Controller at RP118B
11ABI20ED	1301, 1320	ABPV0001	I	5.2.1	ARV Press Controller at RP118B
11ABI21JA	1301, 1320	ABPT0514	I	5.2.2	Steam Generator A PT
11ABI21MA	1301, 1320	ABPT0524	I	5.2.2	Steam Generator B PT
11ABI21RA	1301, 1320	ABPT0534	I	5.2.2	Steam Generator C PT
11ABI21UA	1301, 1320	ABPT0544	I	5.2.2	Steam Generator D PT
11ABK23AA	1320	ABHY0012A	C	5.1.6	SG D MSIV Bypass Valve
11ABK23AB	1320	ABHY0015A	C	5.1.6	SG A MSIV Bypass Valve
11ABK23AC	1320	ABHY0018A	C	5.1.6	SG B MSIV Bypass Valve
11ABK23AD	1320	ABHY0021A	C	5.1.6	SG C MSIV Bypass Valve
11ABK23AE	1301, 1320	K627	C	5.1.6	Steam Line Isolation Signal Relay
11ABK23AF	1301, 1320	ABHS0080	C	5.1.6	MSIV/MSIV Bypass Valve Handswitch
11ABK23AG	1301, 1320	ABHY0012A ABHY0015A ABHY0018A ABHY0021A	C	5.1.6	MSIV Bypass Valves
11ABK28AH	1301, 1320	ABHV0014	C	5.2.3	SG D MSIV
11ABK28BH	1301, 1320	ABHV0020	C	5.2.3	SG C MSIV
11ABK29AH	1301, 1320	ABHV0017	C	5.2.3	SG B MSIV
11ABK29BH	1301, 1320	ABHV0011	C	5.2.3	SG A MSIV
11AEI08AB	1301, 1320	AELT0501	I	5.2.4	SG A Wide Range Level Transmitter
11AEI08BB	1301, 1320	AELT0529	I	5.2.4	SG B Narrow Range Level Transmitter

Table A-8-4
PFSSD Cables Located in Fire Area A-8

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11AEI08CB	1301, 1320	AELT0539	I	5.2.4	SG C Narrow Range Level Transmitter
11AEI12AB	1301, 1320	AELT0551	I	5.2.4	SG A Narrow Range Level Transmitter
11AEI12DB	1301, 1320	AELT0554	I	5.2.4	SG D Narrow Range Level Transmitter
11AEK16AH	1301, 1320	AEFV0039	C	5.2.5	SG A MFIV
11AEK16BH	1301, 1320	AEFV0041	C	5.2.5	SG C MFIV
11AEK17AH	1301, 1320	AEFV0040	C	5.2.5	SG B MFIV
11AEK17BH	1301, 1320	AEFV0042	C	5.2.5	SG D MFIV
11ALB01AD	1301, 1320	DPAL01A	C	5.2.6	Auxiliary Feedwater Pump A Motor
11ALB01AG	1301, 1320	DPAL01A	C	5.2.6	Auxiliary Feedwater Pump A Motor
11ALB01AR	1301, 1320	DPAL01A	C	5.2.6	Auxiliary Feedwater Pump A Motor
11ALB01AS	1301, 1320	DPAL01A	C	5.2.6	Auxiliary Feedwater Pump A Motor
11ALG02BA	1301, 1320	ALHV0035	P	5.2.6	CST to MDAFP A Suction
11ALG02BB	1301, 1320	ALHV0035	C	5.2.6	CST to MDAFP A Suction
11ALG02CA	1301, 1320	ALHV0036	P	5.2.6	CST to TDAFP Suction
11ALG02CB	1301, 1320	ALHV0036	C	5.2.6	CST to TDAFP Suction
11ALG04BA	1301, 1320	ALHV0031	P	5.2.6	ESW to MDAFP A Suction
11ALG04BB	1301, 1320	ALHV0031	C	5.2.6	ESW to MDAFP A Suction
11ALG04BD	1301, 1320	ALHV0031	C	5.2.6	ESW to MDAFP A Suction
11ALG04CA	1301, 1320	ALHV0032	P	5.2.6	ESW to TDAFP Suction (Train A)
11ALG04CB	1301, 1320	ALHV0032	C	5.2.6	ESW to TDAFP Suction (Train A)
11ALG04CD	1301, 1320	ALHV0032	C	5.2.6	ESW to TDAFP Suction (Train A)
11ALI03AC	1301, 1320	ALHV0009	I	5.2.6	MDAFP A to SG B Control Valve

Table A-8-4
PFSSD Cables Located in Fire Area A-8

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ALI03AD	1301, 1320	ALHV0009	I	5.2.6	MDAFP A to SG B Control Valve
11ALI03AE	1301, 1320	ALHV0009	I	5.2.6	MDAFP A to SG B Control Valve
11ALI03AF	1301, 1320	ALHV0009	I	5.2.6	MDAFP A to SG B Control Valve
11ALI03BC	1301, 1320	ALHV0011	I	5.2.6	MDAFP A to SG C Control Valve
11ALI03BD	1301, 1320	ALHV0011	I	5.2.6	MDAFP A to SG C Control Valve
11ALI03BE	1301, 1320	ALHV0011	I	5.2.6	MDAFP A to SG C Control Valve
11ALI03BF	1301, 1320	ALHV0011	I	5.2.6	MDAFP A to SG C Control Valve
11ALI05AC	1301, 1320	ALHV0006	I	5.2.6	TDAFP Discharge to SG D
11ALI05AD	1301, 1320	ALHV0006	I	5.2.6	TDAFP Discharge to SG D
11ALI05AE	1301, 1320	ALHV0006	I	5.2.6	TDAFP Discharge to SG D
11ALI05AF	1301, 1320	ALHV0006	I	5.2.6	TDAFP Discharge to SG D
11ALI05BC	1301, 1320	ALHV0008	I	5.2.6	TDAFP Discharge to SG A
11ALI05BD	1301, 1320	ALHV0008	I	5.2.6	TDAFP Discharge to SG A
11ALI05BE	1301, 1320	ALHV0008	I	5.2.6	TDAFP Discharge to SG A
11ALI05BF	1301, 1320	ALHV0008	I	5.2.6	TDAFP Discharge to SG A
11ALI07JA	1301, 1320	ALPT0025	I	5.2.6	MDAFP A Suction Pressure
11ALI08AA	1301, 1320	ALPT0037	I	5.2.6	CST to AFP Suction Pressure
11ALI09BA	1301, 1320	ALFT0009	I	5.2.6	AFW to SG B Flow
11ALI09CA	1301, 1320	ALFT0011	I	5.2.6	AFW to SG C Flow
11ALK01AA	1301, 1320	DPAL01A	C	5.2.6	Auxiliary Feedwater Pump A Motor
11ALY09CD	1301, 1320	ALHV0009	C	5.2.6	MDAFP A to SG B Control Valve
11ALY09DD	1301, 1320	ALHV0011	C	5.2.6	MDAFP A to SG C Control Valve

Table A-8-4
PFSSD Cables Located in Fire Area A-8

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BBG03AA	1301, 1320	BBHV0013	P	5.2.19	RCP A Thermal Barrier Return Iso Valve
11BBG03AB	1301, 1320	BBHV0013	C	5.2.19	RCP A Thermal Barrier Return Iso Valve
11BBG03BA	1301, 1320	BBHV0014	P	5.2.19	RCP B Thermal Barrier Return Iso Valve
11BBG03BB	1301, 1320	BBHV0014	C	5.2.19	RCP B Thermal Barrier Return Iso Valve
11BBG03CA	1301, 1320	BBHV0015	P	5.2.19	RCP C Thermal Barrier Return Iso Valve
11BBG03CB	1301, 1320	BBHV0015	C	5.2.19	RCP C Thermal Barrier Return Iso Valve
11BBG03DA	1301, 1320	BBHV0016	P	5.2.19	RCP D Thermal Barrier Return Iso Valve
11BBG03DB	1301, 1320	BBHV0016	C	5.2.19	RCP D Thermal Barrier Return Iso Valve
11BBG39AC	1301, 1320	BBHV8000A	C	5.2.7	Pressurizer PORV Block Valve
11BBG39AF	1301, 1320	BBHV8000A	C	5.2.7	Pressurizer PORV Block Valve
11BBG39AJ	1301, 1320	BBHV8000A	C	5.2.7	Pressurizer PORV Block Valve
11BBI15EA	1320	BBPT0405	I	5.1.5	RCS Wide Range Hot Leg Pressure
11BBI15EB	1301, 1320	BBPT0405	I	5.1.5	RCS Wide Range Hot Leg Pressure
11BBI15HB	1301, 1320	BBTE0413A	I	5.2.8	RCS Hot Leg Temp (WR) Loop 1
11BBI15JB	1301, 1320	BBTE0423A	I	5.2.8	RCS Hot Leg Temp (WR) Loop 2
11BBI15KB	1301, 1320	BBTE0443B	I	5.2.8	RCS Cold Leg Temp (WR) Loop 4
11BBI15LB	1301, 1320	BBTE0433B	I	5.2.8	RCS Cold Leg Temp (WR) Loop 3
11BBI16KB	1301, 1320	BBPT0455	I	5.2.2 5.2.7 5.2.31	Pressurizer Pressure Transmitter
11BBI16PB	1301, 1320	BBLT0459	I	5.2.9	Pressurizer Level Transmitter
11BBI28AA	1301, 1320	BBFT0017	I	5.2.19	BBHV0013 Flow Control

Table A-8-4
PFSSD Cables Located in Fire Area A-8

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BBI28BA	1301, 1320	BBFT0018	I	5.2.19	BBHV0014 Flow Control
11BBI28CA	1301, 1320	BBFT0019	I	5.2.19	BBHV0015 Flow Control
11BBI28DA	1301, 1320	BBFT0020	I	5.2.19	BBHV0016 Flow Control
11BBK30AA	1301, 1320	BBHV8001A	C	5.2.10	Head Vent Valve
11BBK40AG	1301, 1320	BBPCV0455A	C	5.2.7	Pressurizer PORV
11BBK40AJ	1301, 1320	BBPCV0455A	C	5.2.7	Pressurizer PORV
11BBK40AK	1301	BBPCV0455A	C	5.2.7	Pressurizer PORV
11BBK40AL	1301	BBPCV0455A	P	5.2.7	Pressurizer PORV
11BBK40AM	1301	BBPCV0455A	C	5.2.7	Pressurizer PORV
11BBK40AN	1301	BBPCV0455A	C	5.2.7	Pressurizer PORV
11BGG11BC	1301, 1320	BGHV8106	C	5.2.11	Charging Pumps to Regenerative Heat Exchanger
11BGG11CA	1301	BGHV8110	P	5.2.12	CCP A Mini-Flow Valve
11BGG11CB	1301	BGHV8110	C	5.2.12	CCP A Mini-Flow Valve
11BGG12AA	1301, 1313, 1318	BGLCV0112B	P	5.1.3	VCT Outlet Valve
11BGG12AB	1301, 1318	BGLCV0112B	C	5.1.3	VCT Outlet Valve
11BGG12AD	1301	BGLCV0112B	C	5.1.3	BNLCV0112D Interlock
11BGG52AA	1301	BGHV8357A	P	5.2.12	CCP A Discharge to RCP Seals
11BGG52AB	1301	BGHV8357A	C	5.2.12	CCP A Discharge to RCP Seals
11BGI51AA	1301, 1314	BGFT0215A	I	5.2.12	RCP Seals Total Flow
11BGI51CA	1301, 1318	BGLT0112	I	5.1.4	VCT Level Transmitter
11BGK48DB	1301, 1320	BGHV8154A	C	5.2.13	Excess Letdown Iso Valve

Table A-8-4
PFSSD Cables Located in Fire Area A-8

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BMK06EA	1320	BMHV0001	C	5.1.6	SG A Blowdown to Flash Tank
11BMK06FA	1320	BMHV0002	C	5.1.6	SG B Blowdown to Flash Tank
11BMK06GA	1320	BMHV0003	C	5.1.6	SG C Blowdown to Flash Tank
11BMK06HA	1320	BMHV0004	C	5.1.6	SG D Blowdown to Flash Tank
11BNG01AA	1301	BNLCV0112D	P	5.2.14	RWST to CCP A Suction Valve
11BNG01AB	1301	BNLCV0112D	C	5.2.14	RWST to CCP A Suction Valve
11BNG03AA	1301	BNHV8812A	P	5.2.15	RWST to RHR A Suction Valve
11BNG03AB	1301	BNHV8812A	C	5.2.15	RWST to RHR A Suction Valve
11BNG03AE	1301, 1314, 1320	BNHV8812A	C	5.2.15	RWST to RHR A Suction Valve
11EFG04AA	1301	EFHV0059	P	5.2.17	Train A CCW Return to ESW UHS
11EFG04AB	1301	EFHV0059	C	5.2.17	Train A CCW Return to ESW UHS
11EFG07AC	1301, 1320	EFHV0031	C	5.2.17	ESW to Trn A Containment Air Coolers
11EFG08AC	1301, 1320	EFHV0049	C	5.2.17	ESW from Trn A Cont Air Coolers
11EFG09AC	1301, 1320	EFHV0033	C	5.2.17	ESW to Trn A Containment Air Coolers
11EFG09CC	1301, 1320	EFHV0045	C	5.2.17	ESW from Trn A Cont Air Coolers
11EGG05AA	1301, 1314	EGHV0015	P	5.2.18	CCW A Pumps Common Header Return Isolation Valve
11EGG05AB	1301, 1314	EGHV0015	C	5.2.18	CCW A Pumps Common Header Return Isolation Valve
11EGG05CA	1301	EGHV0053	P	5.2.18	Train A CCW Supply to Nuclear Aux Comp
11EGG05CB	1301	EGHV0053	C	5.2.18	Train A CCW Supply to Nuclear Aux Comp
11EGG07AA	1301, 1314	EGHV0101	P	5.2.20	CCW A to RHR A Heat Exchanger
11EGG07AB	1301, 1314	EGHV0101	C	5.2.20	CCW A to RHR A Heat Exchanger

Table A-8-4
PFSSD Cables Located in Fire Area A-8

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EGG09AC	1301, 1320	EGHV0058	C	5.2.19	CCW HX to RCP A, B, C and D
11EGG09AD	1301, 1320	EGHV0058	C	5.2.19	CCW HX to RCP A, B, C and D
11EGG09DA	1301, 1320	EGHV0061	P	5.2.19	RCP A, B, C and D to CCW HX
11EGG09DB	1301, 1320	EGHV0061	C	5.2.19	RCP A, B, C and D to CCW HX
11EGG17BA	1301, 1320	EGHV0132	C	5.2.19	RCP A, B, C and D to CCW HX
11EGG17BB	1301, 1320	EGHV0132	C	5.2.19	RCP A, B, C and D to CCW HX
11EGG18AC	1301, 1320	EGHV0126	C	5.2.19	CCW HX to RCP A, B, C and D
11EGG18AD	1301, 1320	EGHV0126	C	5.2.19	CCW HX to RCP A, B, C and D
11EGI19AB	1301, 1320	EGFT0128	I	5.2.19	CCW to RCPs Flow Transmitter
11EGK16AA	1301	EGTV0029	C	5.1.7	CCW A Heat Exchanger Bypass Isolation Valve
11EGK16AC	1301, 1320	EGTV0029	C	5.1.7	CCW A Heat Exchanger Bypass Isolation Valve
11EJG04AA	1301	EJHV8804A	P	5.2.20	RHR A to CVCS CCP Isolation Valve
11EJG04AB	1301	EJHV8804A	C	5.2.20	RHR A to CVCS CCP Isolation Valve
11EJG05AC	1301, 1320	EJHV8701A	C	5.2.16	RCS to RHR Pump A
11EJG05AF	1301, 1320	EJHV8701A	C	5.2.16	EJHV8804A Interlock
11EJG05AG	1301, 1320	EJHV8701A	C	5.2.16	BNHV8812A Interlock
11EJG05AJ	1301, 1320	EJHV8701A	C	5.2.16	RCS to RHR Pump A
11EJG05AK	1314, 1320	EJHV8701A	C	5.2.16	EJHV8811A Interlock
11EJG05BC	1301, 1320	EJHV8701B	C	5.2.16	RCS to RHR Pump B
11EJG05BF	1301, 1320	EJHV8701B	C	5.2.16	EJHV8804B Interlock
11EJG05BG	1301, 1320	EJHV8701B	C	5.2.16	BNHV8812B Interlock
11EJG05BJ	1301, 1320	EJHV8701B	C	5.2.16	RCS to RHR Pump B

Table A-8-4
PFSSD Cables Located in Fire Area A-8

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EJG05BK	1314, 1320	EJHV8701B	C	5.2.16	EJHV8811B Interlock
11EJG06AC	1301, 1320	EJHV8811A	C	5.2.15	Cntmt Recirc Sump Isolation Valve
11EJG06AJ	1314, 1320	EJHV8811A	P	5.2.15	Cntmt Recirc Sump Isolation Valve
11EJG06AK	1314, 1320	EJHV8811A	C	5.2.15	Cntmt Recirc Sump Isolation Valve
11EJG08AB	1301	EJFCV0610	C	5.1.1	RHR A Mini Flow Valve
11EJG08AD	1301	EJFIS0610	C	5.1.1	RHR A Mini Flow Indicating Switch
11EJG08AE	1301	EJFCV0610	P	5.1.1	RHR A Mini Flow Valve
11EJG09CC	1301, 1320	EJHV8809A	C	5.2.16	RHR Pmp A Disch to RCS
11EJG09CD	1301, 1320	EJHV8809A	C	5.2.16	RHR Pmp A Disch to RCS
11EMG02AC	1301, 1320	EMHV8803A	C	5.2.22	Train A BIT Inlet Valve
11EMG02CE	1301, 1320	EMHV8801A	C	5.2.22	Train A BIT Outlet Valve
11EMG02CF	1301	EMHV8801A	C	5.2.22	Train A BIT Outlet Valve
11EMK12BA	1301, 1320	EMHV8964	C	5.2.22	SI Test Line System Outside Ctmt Iso Valve
11ENG03AC	1301, 1320	ENHV0006	C	5.2.2	Train A Containment Spray Isolation Valve
11ENG03AD	1301, 1320	ENHV0006	C	5.2.2	Train A Containment Spray Isolation Valve
11EPG02AE	1301, 1320	EPHV8808A	C	5.2.23	Accumulator TEP01A Injection Vlv
11EPG02BE	1301, 1320	EPHV8808C	C	5.2.23	Accumulator TEP01C Injection Vlv
11GFG01AA	1320	SGF02A	P	5.2.6	AFW Pump A Room Cooler
11GFG01AB	1320	SGF02A	C	5.2.6	AFW Pump A Room Cooler
11GFG01AC	1301, 1320	SGF02A	C	5.2.6	AFW Pump A Room Cooler
11GKG02AE	1301, 1320	SGK04A	C	5.2.33	Train A Control Room A/C Unit
11GKG13AE	1301, 1320	SGK05A	C	5.1.7	Train A Class 1E Electrical Equipment A/C

Table A-8-4
PFSSD Cables Located in Fire Area A-8

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GKG13AF	1301, 1320	SGK05A	C	5.1.7	Train A Class 1E Electrical Equipment A/C
11GLG05AA	1301	DSGL10A	P	5.2.16	RHR A Pump Room Cooler
11GLG05GA	1301	DSGL12A	P	5.2.12	CCP A Pump Room Cooler
11GLY27AB	1301	GLHZ0080	C	5.2.18	CCW A Pump Room Cooler Exhaust Damper
11GLY27AD	1301	GLHZ0081	C	5.2.18	CCW A Pump Room Cooler Exhaust Damper
11GNG02AD	1301, 1320	DSGN01A	C	5.2.24	Containment Cooler Fan A
11GNG02AH	1301, 1320	DSGN01A	C	5.2.24	Containment Cooler Fan A
11GNG02AJ	1301, 1320	DSGN01A	C	5.2.24	Containment Cooler Fan A
11GNG02AK	1301, 1320	DSGN01A	C	5.2.24	Containment Cooler Fan A
11GNG02CD	1301, 1320	DSGN01C	C	5.2.24	Containment Cooler Fan C
11GNG02CH	1301, 1320	DSGN01C	C	5.2.24	Containment Cooler Fan C
11GNG02CJ	1301, 1320	DSGN01C	C	5.2.24	Containment Cooler Fan C
11GNG02CK	1301, 1320	DSGN01C	C	5.2.24	Containment Cooler Fan C
11GNI05AA	1301, 1320	GNPT0937	I	5.2.2	Containment Pressure Transmitter
11JEG01AD	1301, 1320	DPJE01A	C	5.2.25	Train A EDG Fuel Oil Transfer Pump
11KAK02AA	1301, 1314	KAFV0029	C	5.2.32	Containment Instrument Air Supply Valve
11NBB12AD	1301, 1320	NB01	C	5.1.8	Class 1E Bus NB01 Breaker 152NB0112
11NEB01AA	1301	NE01	P	5.2.25	EDG A Phase A Power to NB01
11NEB01AC	1301	NE01	P	5.2.25	EDG A Phase B Power to NB01
11NEB01AE	1301	NE01	P	5.2.25	EDG A Phase C Power to NB01
11NGG01AD	1301, 1320	NG01BAF1	P	5.2.26	Train A 480 VAC Bus
11NGG01AE	1301, 1320	NG01BAF1	P	5.2.26	Train A 480 VAC Bus

Table A-8-4
PFSSD Cables Located in Fire Area A-8

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11NGG01AJ	1301, 1320	NG01TAF1	P	5.2.26	Train A 480 VAC Bus
11NGG01BF	1301, 1320	NG03TAF1	P	5.2.26	Train A 480 VAC Bus
11PNG01AE	1301, 1320	PN07	P	5.1.2	Non Class IE 120 VAC Instrument
11QBY03CA	1301, 1320	CR Emerg Lights	C	5.2.27	Control Room Emerg Lights
11RPK09CA	1301, 1320	RP209	P	5.1.6	Auxiliary Relay Rack
11SBS10AB	1301	SB102A	P	5.2.28	Reactor Trip Switchgear
11SBS12AC	1301	SB102A	C	5.2.28	Reactor Trip Switchgear
11SES07BA	1301	SENY0060B	P	5.2.29	Source Range Monitor
11SES07BB	1301	SENY0060B	C	5.2.29	Source Range Monitor
11SES07CA	1301	SENY0060A	P	5.2.29	Source Range Monitor
12BBI15NA	1314	BBPT0403	I	5.2.16	RCS Press Wide Range Hot Leg
12FCK23AX	1301, 1320	FCHV0312 FCFV0313	C	5.2.6	TDAFP Trip and Throttle Valve TDAFP Speed Governing Valve
13ABI20GA	1320	ABPT0003	I	5.2.1	ARV ABPV0003 Pressure Control
13ABI20GC	1320	ABPV0003	I	5.2.1	ARV Press Controller at RP118B
13ABI20GD	1320	ABPV0003	I	5.2.1	ARV Press Controller at RP118B
13ABI20GE	1320	ABPY0003	I	5.2.1	ABPV0003 I/P Converter
13ABI21PA	1320	ABPT0526	I	5.2.2	SG B Steamline Pressure Transmitter
13ABI21TA	1320	ABPT0536	I	5.2.2	SG C Steamline Pressure Transmitter
14BBG12AC	1301	BBPV8702A	C	5.2.16	EJHV8804A Interlock
14BBG12AD	1301	BBPV8702A	C	5.2.16	BNHV8812A Interlock
14BBG12AE	1314	BBPV8702A	C	5.2.16	EJHV8811A Interlock

Table A-8-4
PFSSD Cables Located in Fire Area A-8

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BBG12BC	1301	BBPV8702B	C	5.2.16	EJHV8804B Interlock
14BBG12BD	1301	BBPV8702B	C	5.2.16	BNHV8812B Interlock
14BBG12BK	1314	BBPV8702B	C	5.2.16	EJHV8811B Interlock
14BGG11AA	1320	BGHV8105	P	5.2.11	Charging Pumps to Regenerative Heat Exchanger
14BGG11AB	1320	BGHV8105	C	5.2.11	Charging Pumps to Regenerative Heat Exchanger
14BGG12BA	1318, 1320	BGLCV0112C	P	5.1.3	VCT Outlet Valve
14BGG12BB	1318, 1320	BGLCV0112C	C	5.1.3	VCT Outlet Valve
14BGI51DA	1320	BGLT0185	I	5.1.4	VCT Level Transmitter
14BNG03BK	1301, 1314	BNHV8812B	C	5.2.2 5.2.15	RWST to RHR B Suction Valve
14EGG09CA	1320	EGHV0071	P	5.2.19	CCW HX to RCP A, B, C and D
14EGG09CB	1320	EGHV0071	C	5.2.19	CCW HX to RCP A, B, C and D
14EGG18BA	1320	EGHV0127	P	5.2.19	CCW HX to RCP A, B, C and D
14EGG18BB	1320	EGHV0127	C	5.2.19	CCW HX to RCP A, B, C and D
14EGG18DA	1320	EGHV0133	P	5.2.19	RCP A, B, C and D to CCW HX
14EGG18DB	1320	EGHV0133	C	5.2.19	RCP A, B, C and D to CCW HX
14EGI19BB	1320	EGFT0129	I	5.2.19	CCW to RCPs Flow Transmitter
14EJG06BF	1301	EJHV8811B	C	5.2.15	BNHV8812B Interlock
14EJG06BJ	1314	EJHV8811B	P	5.2.15	Cntmt Sump Isolation Valve
14EJG06BK	1314	EJHV8811B	C	5.2.15	Cntmt Sump Isolation Valve
14EMG02BA	1320	EMHV8803B	P	5.2.22	CCP B to BIT Inlet Isolation Valve

Table A-8-4
PFSSD Cables Located in Fire Area A-8

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EMG02BB	1320	EMHV8803B	C	5.2.22	CCP B to BIT Inlet Isolation Valve
14EMG02DA	1320	EMHV8801B	P	5.2.22	BIT to RCS Isolation Valve
14EMG02DB	1320	EMHV8801B	C	5.2.22	BIT to RCS Isolation Valve
14SES07BB	1320	SENY0061B	I	5.2.29	Source Range Monitor
15BGK10AD	1320	BGLCV0459	C	5.2.21	Letdown Isolation Valve
15BGK10BD	1320	BGLCV0460	C	5.2.21	Letdown Isolation Valve
15BGK35AD	1320	BGHV8149A	C	5.2.21	Letdown Orifice Isolation Valve
15BGK35BD	1320	BGHV8149B	C	5.2.21	Letdown Orifice Isolation Valve
15BGK35CD	1320	BGHV8149C	C	5.2.21	Letdown Orifice Isolation Valve
15BMK06AB	1301	BMHV0001	C	5.1.6	SG A to Blowdown Flash Tank Isolation Valve
15BMK06AC	1320	BMHV0001	C	5.1.6	SG A to Blowdown Flash Tank Isolation Valve
15BMK06BB	1301	BMHV0002	C	5.1.6	SG B to Blowdown Flash Tank Isolation Valve
15BMK06BC	1320	BMHV0002	C	5.1.6	SG B to Blowdown Flash Tank Isolation Valve
15BMK06CB	1301	BMHV0003	C	5.1.6	SG C to Blowdown Flash Tank Isolation Valve
15BMK06CC	1320	BMHV0003	C	5.1.6	SG C to Blowdown Flash Tank Isolation Valve
15BMK06DB	1301	BMHV0004	C	5.1.6	SG D to Blowdown Flash Tank Isolation Valve
15BMK06DC	1320	BMHV0004	C	5.1.6	SG D to Blowdown Flash Tank Isolation Valve
15BMK16AA	1301	BM157	P	5.1.6	Steam Generator Blowdown Control Panel
15EJI12AA	1301	EJHCV0606	I	5.1.2	RHR A Heat Xchgr Discharge Control Valve
15GKK31CA	1301, 1320	95XGK07	C	5.1.7	SGK05A Fire Signal Isolation
15PGA10AA	1301, 1314	PA0105	C	5.2.34	Load Centers PG11, PG13 and PG25 Fdr Bkr
15PGA10BA	1301	PA0106	C	5.2.34	Load Centers PG15, PG17 and PG19 Fdr Bkr

Table A-8-4
PFSSD Cables Located in Fire Area A-8

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15PGA10BB	1301, 1314	PA0106	C	5.2.34	Load Centers PG15, PG17 and PG19 Fdr Bkr
15PGG02AB	1301, 1311, 1314, 1315	PG1900	P	5.1.2	480V Non-Class 1E LC Feeder From PG1500
15PGG02AF	1301, 1314, 1315, 1320	PG19G	P	5.1.2	480 V Non-Class 1E Aux Bldg MCC
15PGG02AX	1301, 1314, 1315, 1320	PG19GAF8	P	5.1.2	Incoming Line From Load Center PG19
15PGG13DA	1301, 1314	PG1901	C	5.1.2	Bus PG19 Feeder Breaker
15PGG13DC	1301, 1314	PG1901	C	5.1.2	Bus PG19 Feeder Breaker
15RPK09NA	1301, 1320	RP330	P	5.1.7	Reverse Isolation Relay Rack
16PGA10CA	1314, 1321	PA0206	C	5.2.34	Load Centers PG12, PG16 and PG26 Fdr Bkr
16PKG11BA	1301	PK22	P	5.2.30	125VDC Non-Class 1E Battery Charger
16PKG13AA	1301	PK04	P	5.2.35	125VDC Non-Class 1E Battery Charger

5.2.1 Steam Generator Atmospheric Relief Valves

PFSSD requires at least two steam generator atmospheric relief valves (ARV) be controlled and the other two closed. The ARVs are pneumatically operated using air from the compressed air system (KA) or nitrogen from the nitrogen accumulators. The valves open by pneumatic pressure and close by spring action. The valves are automatically controlled by a pressure input signal from a transmitter installed on the outlet side of the steam generator. Alternatively, each valve can be controlled manually from the control room or the auxiliary shutdown panel by placing the pressure indicating controller (PIC) in manual.

A fire in area A-8 could damage cables and equipment associated with both the Train A Motor Driven Auxiliary Feedwater Pump (MDAFP) and the Turbine Driven Auxiliary Feedwater Pump (TDAFP). The Train B MDAFP is unaffected by a fire in area A-8 and will be used to supply auxiliary feedwater to Steam Generators A and D. Therefore, it will be necessary to control steam release using ARVs on steam generators A (ABPV0001) and D (ABPV0004) and isolate the ARVs for steam generators B (ABPV0002) and C (ABPV0003).

Cable 11ABI20EA is the instrument cable for pressure transmitter ABPT0001. Damage to this cable could prevent ARV ABPV0001 on SG A from operating automatically. If this occurs, operators can override the pressure transmitter input signal and operate the ARV manually using the pressure indicating controller (ABPIC0001A) in the control room. However, as discussed below, other cable damage due to the same fire could prevent operating ABPV0001 from the control room.

Cables 11ABI20EC and 11ABI20ED are associated with ARV ABPV0001 pressure indicating controller at remote shutdown panel RP118A. Cable 11ABI20EC is associated with hand switch ABHS0001 located on RP118A, and is used to transfer control of ABPV0001 to ABPIC0001B on RP118A. Cable 11ABI20ED connects ABPIC0001B on RP118A to instrument rack RP053AC. A fire-induced short circuit in cable 11ABI20EC could cause a spurious transfer of control to ABPIC0001B on RP118A, which would prevent manual operation of ARV ABPV0001 from the control room. In addition, concurrent damage to cable 11ABI20ED could cause a loss of control of ABPV0001 from RP118A. Therefore, control of ARV ABPV0001, using any available means, could be lost. To prevent uncontrolled cooldown due to a spuriously opened ARV ABPV0001, operators may need to fail it closed by isolating air and nitrogen to the valve using KAV1435 (air) and KAV1364 (nitrogen), then venting air from the regulator. These valves are located in area A-23 and emergency lighting is available.

Cable 13ABI20GA is the instrument cable for pressure transmitter ABPT0003. Damage to this cable could prevent ARV ABPV0003 from operating automatically. If this occurs, operators can override the pressure transmitter input signal and operate the ARV manually using the pressure indicating controller (ABPIC0003A) in the control room.

Cables 13ABI20GC and 13ABI20GD are associated with ARV ABPV0003 pressure indicating controller at remote shutdown panel RP118A. Cable 13ABI20GC is associated with hand switch ABHS0003 located on RP118A, and is used to transfer control of ABPV0003 to ABPIC0003B on RP118A. Cable 13ABI20GD connects ABPIC0003B on RP118A to instrument rack RP053DC. A fire-induced short circuit in cable 13ABI20GC could cause a spurious transfer of control to ABPIC0003B on RP118A, which would prevent manual operation of ARV ABPV0003 from the control room. In addition, concurrent damage to cable 13ABI20GD could cause the ARV to spuriously open. If this occurs, local controller ABFHC0003, in room 1509, can be used to isolate the valve. Emergency lighting is available.

Cable 13ABI20GE is associated with ABPV0003 electro-pneumatic transducer ABPY0003. Damage to this cable could result in the inability of ABPV0003 to operate automatically or manually from the control room or remote shutdown panel. However, as discussed previously,

ABPV0003 can be isolated using ABFHC0003 in room 1509 or by closing associated air and nitrogen supply lines.

Cables associated with ARVs ABPV0002 (SG B) and ABPV0004 (SG D) do not run through fire area A-8. Therefore, ABPV0002 can be isolated and ABPV0004 can be controlled from the control room if a fire occurs in area A-8. Calculation WCNOC-CP-002 demonstrates the ability to cool down with all four steam generator ARVs closed and with auxiliary feedwater supplying two steam generators. In this case, the SG safety valves open to release steam. This bounds the case where one of the ARVs that is receiving AFW is available to be controlled from the control room. Calculation WCNOC-CP-002 also evaluates the case where two ARVs spuriously open and only one of the ARVs can receive AFW. In this case, the steam generator not receiving AFW will boil dry due to the open safety valves while heat transfer in the other steam generator can be maintained using AFW and the available ARV.

Based on the above discussion and the results of Calculation WCNOC-CP-002, there is reasonable assurance that damage to the steam generator ARVs as described above will not adversely impact the ability to achieve and maintain safe shutdown if a fire occurs in area A-8.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB20A, E-13AB20B, E-1F9101, J-110-00216, J-110-00217, J-110-00220, J-110-00221, M-12AB01, M-12KA04, M-12KA05, Calculation WCNOC-CP-002

5.2.2 Safety Injection and Containment Spray

Calculation XX-E-013, Appendix 1 (PFSSD Support Section) provides a detailed discussion about the potential PFSSD impact of a spurious safety injection signal (SIS) and spurious containment spray actuation signal (CSAS). This section discusses the specific PFSSD impact if a fire occurs in this area.

Cables associated with steam line pressure transmitters ABPT0514, ABPT0524, ABPT0526, ABPT0534, ABPT0536 and ABPT0544 are run in area A-8. Consequently, the two out of three logic for low steam line pressure initiation of SIS can be satisfied on steam generators B and C if a fire occurs in area A-8.

Cables associated with BBPT0455 are run in area A-8. Cables associated with BBPT0456, BBPT0457 and BBPT0458 are not run in area A-8. Consequently, a fire in area A-8 cannot cause a spurious SIS due to low pressurizer pressure.

Containment pressure transmitter GNPT0937 and associated cables are located in area A-8. Cables for pressure transmitters GNPT0934, GNPT0935 and GNPT0936 are not run in area A-8. Consequently, a spurious CSAS due to high containment pressure cannot occur if a fire occurs in area A-8.

Control cables associated with Train A containment spray isolation valve ENHV0006 are run in fire area A-8. Damage to these cables could cause the valve to spuriously open. However, as stated in the previous paragraph, a spurious CSAS is not credible if a fire occurs in this area. In addition, control cables associated with the Train A containment spray pump are located outside fire area A-8. Therefore, the Train A containment spray pump will not spuriously start if a fire occurs in area A-8.

A spurious SIS starts the charging sequence which starts the CCPs and opens the BIT flowpath valves. For a fire in this area, three of the BIT flowpath valves (EMHV8801A, EMHV8803A and EMHV8803B) could be affected. These valves could remain closed if affected by a fire concurrent with the SIS, which would prevent CCP discharge flow through this path. RWST valve BNLCV0112E is unaffected and would open on a SIS, providing an assured suction source to the CCPs. The Train A CCP mini flow valve could be affected but the Train B CCP miniflow valve is unaffected. Train B CCW flow to the seal water heat exchanger is unaffected, and will ensure cooling of the recirc flow and RCP seal return. Also, Train B CCW flow is available for the Train B CCP oil cooler. Therefore, the Train B charging pump will not be affected by a spurious SIS caused by a fire in this area.

Both VCT outlet valves are located in this area. License Amendment 205 provides reasonable assurance that at least one of the VCT outlet valves will close in response to the SIS and RWST valves opening. See Section 5.1.3.

A start of the credited CCW system (Train B) will not adversely impact the system. The Train B ESW system is unaffected and will start on a spurious SIS, providing necessary cooling water to the CCW heat exchanger.

A start of the AFW pumps will not adversely impact PFSSD. The Train B AFW pump is credited for a fire in this area. Suction from the CST to the Train B AFW pump is unaffected. Discharge flow will either return to the CST or flow to the steam generators through the discharge control valves. Therefore, the Train B AFW pump is unaffected by a spurious SIS caused by a fire in this area.

A start of the RHR pumps due to a spurious SIS could damage both RHR pumps. A spurious low RWST level signal is not credible if a fire occurs in this area. However, cables 11BNG03AE (BNHV8812A) and 14BNG03BK (BNHV8812B) are run in this area. Damage to the 11BNG03AE cable could cause BNHV8812A to close. If this occurs with the A RHR pump running, then the A RHR pump would be damaged. Cable 14BNG03BK for the B RHR valve BNHV8812B is a fire resistive control cable and will prevent spurious operation of BNHV8812B. Therefore, the B RHR pump would not be damaged.

Based on the above discussion, a fire in area A-8 could cause a spurious SIS due to low steamline pressure. The spurious SIS will not cause damage to credited hot standby equipment. Train A of RHR could be affected but Train B is unaffected. Therefore, PFSSD hot standby and cold shutdown are assured.

References: E-15000, XX-E-013, E-13AB21, E-13BB16, E-13BN03, E-13BN03A, E-13EM01, E-13EN03, E-13GN05, E-1F9431, E-1F9432, E-1F9433, M-12AB01, M-12BB02, M-12BN01, M-12EJ01, M-12GN01, OFN KC-016, CR 25002, CP 13613, CP 13615

5.2.3 Steam Generator Main Steam Isolation Valves (MSIVs)

PFSSD requires the MSIVs be closed to prevent reactivity addition due to uncontrolled cooldown. The MSIVs are closed from the control room using all close hand switches ABHS0079 or ABHS0080.

Each MSIV is designed to utilize system fluid (main steam) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main steam. This is done by actuating either all close hand switch ABHS0079

(separation group 4) or ABHS0080 (separation group 1) to de-energize the associated solenoid valves.
The following table identifies the solenoids and associated control cables for each hand switch.

MSIV	ABHS0079 (Sep Group 4)		ABHS0080 (Sep Group 1)	
	Solenoids	Cable	Solenoids	Cable
ABHV0011	MV2, MV4, MV6	14ABK28BH	MV1, MV3, MV5	11ABK29BH
ABHV0014	MV2, MV4, MV6	14ABK29AH	MV1, MV3, MV5	11ABK28AH
ABHV0017	MV2, MV4, MV6	14ABK28AH	MV1, MV3, MV5	11ABK29AH
ABHV0020	MV2, MV4, MV6	14ABK29BH	MV1, MV3, MV5	11ABK28BH

All 4 cables associated with the 12 separation group 1 solenoid valves are run in area A-8. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 4 cables associated with hand switch ABHS0079 are unaffected by a fire in area A-8. Therefore, hand switch ABHS0079 is available to close the four MSIVs.

Based on the above discussion, hand switch ABHS0079 is available to close the MSIVs in the event of a fire in area A-8.

References: E-15000, XX-E-013, E-13AB23A, E-13AB23B, E-13AB26, E-13AB27, E-13AB28, E-13AB29, E-1F9101, M-12AB02

5.2.4 Steam Generator Level Indication

The decay heat removal function for PFSSD requires the use of two RCS loops and two Steam Generators. Steam generator (SG) level indication is required to support this function. A fire in area A-8 uses MDAFP B, which is normally aligned to supply SGs A and D.

Cables 11AEI08BB and 11AEI08CB are associated with SGs B and C level transmitters AELT0529 (NR) and AELT0539 (NR). Damage to these cables due to a fire will not adversely impact PFSSD because SGs A and D are credited for a fire in this area. Furthermore, the remaining level transmitters on SGs B and C are unaffected by a fire in area A-8.

Cable 11AEI08AB, associated with SG A wide range level transmitter AELT0501, and cable 11AEI12AB, associated with SG A narrow range level transmitter AELT0551, run through area A-8. Cables for SG A narrow range level transmitters AELT0517, AELT0518, and AELT0519 run in a different fire area and are unaffected by a fire in this area. Therefore, level indication for SG A is available if a fire occurs in area A-8.

Cable 11AEI12DB, associated with SG D narrow range level transmitter AELT0554, runs through this fire area. Cables for SG D wide range level transmitter AELT0504 and SG D narrow range level transmitters AELT0547, AELT0548, and AELT0549 run in a different fire area and are unaffected by a fire in area A-8. Therefore, level indication for SG D is available if a fire occurs in area A-8.

Based on the above discussion, steam generator A and D level indication is assured if a fire occurs in area A-8.

References: E-15000, XX-E-013, E-1F9203, E-13AE08, M-12AE02

5.2.5 Steam Generator Main Feedwater Isolation Valves

PFSSD requires that either the main feedwater isolation valves (MFIVs) be closed or the main feedwater pumps be stopped to prevent overfilling the steam generators. Flow diversion from auxiliary feedwater (AFW) to the main feedwater system piping is prevented by check valves AEV0420, AEV0421, AEV0422 and AEV0423. Closure of the main feedwater isolation valves is not required to prevent AFW flow diversion.

Each MFIV is designed to utilize system fluid (feedwater) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main feedwater. This is done by actuating either all close hand switch AEHS0080 (separation group 1) or AEHS0081 (separation group 4) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MFIV	AEHS0080 (Sep Group 1)		AEHS0081 (Sep Group 4)	
	Solenoids	Cable	Solenoids	Cable
AEFV0039	MV1, MV3, MV5	11AEK16AH	MV2, MV4, MV6	14AEK17AH
AEFV0040	MV1, MV3, MV5	11AEK17AH	MV2, MV4, MV6	14AEK16AH
AEFV0041	MV1, MV3, MV5	11AEK16BH	MV2, MV4, MV6	14AEK17BH
AEFV0042	MV1, MV3, MV5	11AEK17BH	MV2, MV4, MV6	14AEK16BH

All 4 cables associated with the 12 separation group 1 solenoid valves are run in area A-8. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 4 cables associated with hand switch AEHS0081 are unaffected by a fire in area A-8. Therefore, hand switch AEHS0081 is available to close the four MFIVs.

Based on the above discussion, MFIV isolation is assured using hand switch AEHS0081.

References: E-15000, XX-E-013, E-13AE14, E-13AE15, E-13AE16, E-13AE17, E-1F9201, M-12AE02

5.2.6 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire AFW demand to achieve cold shutdown.

Motor operated valves (MOVs) in the system allow operators to line up the auxiliary feedwater system as required to achieve and maintain safe shutdown. Damage to the MOV circuits due to a fire could prevent operators from lining up the system from the control room.

Several PFSSD cables associated with various components of the auxiliary feedwater system (AL) run through fire area A-8. These cables are identified in Table A-8-4. All cables are associated with Train A (separation group 1). There are no Train B (separation group 4) cables associated with the AFW system running through area A-8.

Damage to the Train A cables listed in Table A-8-4 could prevent operation of Train A MDAFP and the TDAFP. However, Train B MDAFP and associated components are unaffected by a fire in area A-8.

Condensate storage tank pressure transmitters ALPT0037, ALPT0038 and ALPT0039 are included in the PFSSD design because they initiate swapover to ESW upon 2/3 low CST pressure indications. A spurious low CST pressure due to fire damage to cables associated with two of these pressure transmitters will swap the water source to ESW. As stated earlier, this is a commercial concern and should be prevented if possible.

Cables associated with ALPT0037 are run through area A-8. Cables associated with the remaining two pressure transmitters are not run in A-8. Therefore, a swapover to ESW due to spurious low CST pressure is not feasible if a fire occurs in area A-8.

PFSSD is assured for a fire in area A-8 using Train B MDAFP supplying auxiliary feedwater to steam generators A and D.

References: E-15000, XX-E-013, E-13AL01A, E-13AL01B, E-13AL02A, E-13AL02B, E-13AL03A, E-13AL03B, E-13AL04A, E-13AL04B, E-13AL05A, E-13AL05B, E-13FC23, E-13FC24, E-1F9204, M-12AL01

5.2.7 Pressurizer Power Operated Relief Valves and Associated Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed. Cables associated with PORV BBPCV0455A and associated block valve BBHV8000A are run through area A-8. Cables associated with PORV BBPCV0456A and associated block valve BBHV8000B are not located in area A-8.

A fire in area A-8 could cause PORV BBPCV0455A to spuriously open due to a cable to cable proper polarity hot short. The hot short would need to involve a positive 125 VDC source conductor in contact with conductor 22 in cable 11BBK40AK. This cable is run in cable tray with other 125 VDC sources, so this failure mode is postulated to occur. Therefore, pressurizer PORV BBPCV0455A could spuriously open in the event of a fire in area A-8. In addition, block valve BBHV8000A is also affected by a fire in this area and may not close.

In the event a fire causes BBPCV0455A to open and damages BBHV8000A cables, Operators can close BBPCV0455A by placing hand switch BBHIS0455A, located on RL021, in the close position. Pressurizer level and RCS pressure indication are available to diagnose a failed open PORV using BBLI0460A and BBPI0406, respectively. In addition, pressurizer pressure indication is available using BBPI0456, BBPI0457 and BBPI0458.

An instrument cable (11BBI16KB) associated with pressurizer pressure transmitter BBPT0455 is run in fire area A-8. Damage to this cable could send a spurious high-pressure signal to the pressurizer master controller. However, as discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure channel will not cause the spurious operation of the pressurizer PORVs.

Based on the above discussion, pressurizer PORV BBPCV0455A could spuriously open due to damage to the PORV control cable. Block valve BBHV8000A may not close due to cable damage. If this occurs, the PORV can be closed using hand switch BBHIS0455A in the main control room.

References: E-15000, XX-E-013, E-13BB16, E-13BB39, E-13BB40, E-1F9301, M-12BB02, M-744-00028, OFN KC-016, CR 13079, DCP 12944 DCP 13324.

5.2.8 RCS Hot and Cold Leg Temperature Elements

PFSSD requires RCS hot and cold leg temperature indication on at least one loop to verify flow through the steam generators. The temperature elements used for this purpose are listed in Table A-8-5.

As identified in Table A-8-4, cables associated with RCS temperature elements BBTE0413A, BBTE0423A, BBTE0433B and BBTE0443B are run in area A-8. These cables are run in the same raceway through fire area A-8. A fire could damage these cables and cause temperature indication on these four temperature elements to be unavailable. Consequently, temperature indication on at least one leg on each loop could be lost, which is not in accordance with the PFSSD methodology at Wolf Creek.

Table A-8-5
RCS Hot and Cold Leg Temperature Elements Used for PFSSD

COMPONENT	FUNCTION
BBTE0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	RCS Cold Leg Temperature Element (WR) Loop 4

EMG ES-04 provides alternate indication that may be used. One of these methods verifies that steam generator pressure is stable or decreasing. S/G “A” and S/G “D” pressure instruments ABPT516 and ABPT546 are unaffected by a fire in A-8 and can be used per EMG ES-04 to verify heat removal in loops 1 and 4.

The configuration is acceptable because, in the event of fire in fire area A-8, cooldown will be performed using RCS loops 1 and 4. RCS wide range hot and cold leg temperature elements (BBTE413B and BBTE443A) as well as ABPT516 and ABPT546 will provide indication.

References: E-15000, XX-E-013, E-1F9201, E-13BB15, M-12AB01, M-12BB01, EMG ES-04

5.2.9 Pressurizer Level Transmitters

PFSSD requires pressurizer level indication to be available. Pressurizer level indication is provided by level transmitters BBLT0459 and BBLT0460. A cable associated with level transmitter BBLT0459 is run in this fire area. Consequently, pressurizer level may not be available on level indicator BBLI0459.

Cables associated with pressurizer level transmitter BBLT0460 do not run through fire area A-8. Therefore, level indication is available using level indicator BBLI0460.

References: E-15000, XX-E-013, E-13BB16, E-1F9301

5.2.10 Reactor Head Vent Valves

PFSSD requires that one of the two reactor vessel head vent valves on each flow path (2 flow paths total) be closed to prevent uncontrolled depressurization of the RCS. Either BBHV8001A or BBHV8002A and either BBHV8001B or BBHV8002B needs to be closed.

Only one cable associated with head vent valve BBHV8001A is run through A-8. An external (+) 125VDC hot short across conductor 2 in this cable is the only failure that will spuriously open this valve. Since this cable is run in tray with other cables carrying the proper voltage and polarity, this failure is possible.

Cables for the remaining three head vent valves are not run through area A-8 and are unaffected by a fire in A-8. Therefore, the spurious opening of BBHV8001A is mitigated by maintaining valve BBHV8002A closed. The second flow path is isolated using either head vent valve BBHV8001B or BBHV8002B.

Based on this discussion, both head vent valve flow paths can be isolated.

References: E-15000, XX-E-013, E-1F9301, E-13BB30, M-12BB04

5.2.11 Charging Flow to Regenerative Heat Exchanger Isolation Valves

PFSSD requires charging flow to be directed to RCP seals. To ensure adequate flow to RCP seals, flow diversion to the regenerative heat exchanger needs to be prevented. Valves BGHV8105 and BGHV8106 are included in the PFSSD design to accomplish this task. Manual valve BG8402B is also included to provide an alternate means of closing this flow path if either BGHV8105 or BGHV8106 are unavailable, and is also used during alternate safe shutdown per OFN RP-017.

Cables associated with BGHV8106 are run in area A-8 and could be damaged by a fire, preventing valve BGHV8106 from being closed from the control room.

Cables 14BGG11AA and 14BGG11AB are power and control cables, respectively, associated with BGHV8105 and are run in conduit 114U3D5R (room 1320). This conduit is wrapped with Thermo-Lag fire barrier material that was upgraded to a 1-hour fire resistance rating by Change Package 011888. In addition, automatic fire suppression and detection is installed in the area. This configuration meets the Wolf Creek commitment to 10CFR50, Appendix R section III.G.2.c for protection of one redundant train of equipment. Therefore, a fire in area A-8 will not impact the ability to ensure valve BGHV8105 can be closed using BGHIS8105 in the control room.

Based on the above discussion, there is reasonable assurance that valve BGHV8105 can be closed from the control room using BGHIS8105. This configuration meets Wolf Creek's commitments to 10CFR50, Appendix R Section III.G.2 and is, therefore, acceptable.

References: E-15000, XX-E-013, E-1F9102, E-1F9302, E-13BG11A, E-1R1343B, E-1R8900, M-12BG03, E-097, PIR 2005-2355, DCP 011888

5.2.12 Reactor Coolant Pump Seal Injection

PFSSD requires RCP seal injection to provide a boron injection path, provide makeup to the RCS and provide cooling to the RCP seals. The redundant boron injection and makeup path is through the boron injection tank (BIT). The redundant seal cooling method uses thermal barrier cooling.

Seal injection is accomplished by opening either BGHV8357A (for seal injection using PBG05A) or BGHV8357B (for seal injection using PBG05B). The PFSSD design also requires that either BGHV8110 (if using the BGHV8357A flow path) or BGHV8111 (if using the BGHV8357B flow path) be open to prevent the operating CCP from overheating due to low-flow.

Power and control cables for BGHV8110 run through fire area A-8 and could be damaged by a fire. In addition, cables associated with the CCP A room cooler SGL12A run through area A-8 and could be damaged, preventing operation of the room cooler. Also, a number of components associated with Train A component cooling water (CCW) may be inoperable due to damage to associated cables. Therefore, operation of the Train A CCP cannot be credited for a fire in area A-8.

Cables and components associated with the Train B CCP (PBG05B), as well as required PFSSD support functions, are unaffected by a fire in area A-8. Therefore, a fire in area A-8 will use the Train B CCP to achieve reactivity control and reactor coolant makeup goals.

A fire in area A-8 will not impact the ability to provide charging flow through the RCP seals using Train B charging pump. However, seal injection could temporarily be interrupted since the VCT outlet valves could spuriously close and automatic swapover to the RWST may not occur. Also, the normal charging pump is assumed to fail since it is not analyzed. As discussed in Section 5.2.2 a spurious SIS could occur, causing an automatic start of the CCPs. This will also cause valve BNLCV0112E to open, ensuring a suction source to the Train B CCP. If an SIS does not occur, it may be necessary for operators to line up Train B CCP from the control room. If RCP seal injection is not lined up within 12 minutes, operators should stop the RCPs, isolate seal injection and use natural circulation for cooldown.

Cable 11BGI51AA is associated with RCP seal total flow transmitter BGFT0215A. Damage to this cable could prevent operation of the flow transmitter and could prevent operators from determining total RCP seal flow using flow indicator BGFI0215A. Flow indicator BGFI0215B is unaffected by a fire in area A-8 and can be used by operators to determine if seal flow is functioning.

As discussed in Section 5.2.19, RCP thermal barrier cooling (TBC) could be affected by a fire in this area. Therefore, TBC may be unavailable to provide redundant seal cooling.

Based on the above discussion, RCP seal injection is available to provide boration, inventory control and RCP seal cooling. However, suction to the CCP may temporarily be lost causing a loss of charging until the RWST can be lined up. The RWST can be lined up from the control room as discussed in Section 5.2.14, so RCP seal injection will be available. RCP seal flow is available using BGFI0215B.

References: E-15000, XX-E-013, E-13BG11, E-13BG51, E-1F9102, E-1F9302, M-12BG03

5.2.13 Excess Letdown

PFSSD requires the excess letdown path be isolated to prevent uncontrolled depressurization of the RCS. To accomplish this, either normally closed valve BGHV8153A or BGHV8154A must be maintained closed and either normally closed valve BGHV8153B or BGHV8154B must be maintained closed. Cables associated with these valves are listed in Table A-8-4.

Only circuits associated with BGHV8154A run through fire area A-8. Therefore, the remaining valves are unaffected by a fire in area A-8 and will remain closed, and thereby achieving the PFSSD goals for this system.

References: E-15000, XX-E-013, E-1F9301, E-13BG48, M-12BG01

5.2.14 Refueling Water Storage Tank (RWST) to Charging Pumps Suction Isolation Valves

As stated earlier, the Train A CCP may not be available due to a fire in area A-8. Therefore, the Train B CCP is used, taking suction from the RWST. Cables associated with valve BNLCV0112E are unaffected by a fire in area A-8. Therefore, BNLCV0112E can be opened from the control room to provide the necessary suction from the RWST to the Train B CCP.

Cables associated with BNLCV0112D are run through fire area A-8. Damage to these cables will have no adverse impact on PFSSD due to the availability of BNLCV0112E.

A fire in area A-8 will use CCP B taking suction from the RWST through valve BNLCV0112E.

References: E-15000, XX-E-013, E-13BN01, E-1F9102, E-1F9302, M-12BG03, M-12BN01

5.2.15 Refueling Water Storage Tank (RWST) and Containment Sump Isolation Valves

To prevent draindown of the RWST into the containment sump, PFSSD requires that either valve BNHV8812A or valve EJHV8811A and valve BNHV8812B or valve EJHV8811B be closed during hot standby. For cold shutdown, the operating train containment sump valve (EJHV8811A or EJHV8811B) must be maintained closed to prevent flow diversion from the RCS to the containment sump. Valves BNHV8812A and BNHV8812B are normally open and valves EJHV8811A and EJHV8811B are normally closed.

Power and control cables for valve BNHV8812A run through fire area A-8. Damage to these cables could prevent closing this valve from the control room and could prevent the valve from automatically closing if valve EJHV8811A reaches full open position.

Power and control cables for valve EJHV8811A are also run through fire area A-8. Damage to these cables will not cause the valve to spuriously open unless valve BNHV8812A is fully closed at the time of the fire. In this case, draindown will not occur because BNHV8812A is closed. With BNHV8812A in the normally open position, there are no credible combinations of hot shorts, open circuits or shorts to ground sufficient to cause valve EJHV8811A to spuriously open. Therefore, valve EJHV8811A will remain closed and draindown of the RWST to the containment sump through this flowpath is not credible if a fire occurs in this area.

Only one control cable (14BNG03BK) for valve BNHV8812B runs through area A-8. This cable is a fire resistive cable and is protected against failure due to a fire in this area. Therefore, valve BNHV8812B can be operated from the control room if a fire occurs in the area (A-8).

Three cables (14EJG06BF, 14EJG06BJ and 14EJG06BK) associated with EJHV8811B run through area A-8. Damage to three phase power cable 14EJG06BJ will not cause the valve to spuriously open. Damage to control cable 14EJG06BK will not cause the valve to spuriously open. An intra-cable hot short within cable 14EJG06BF will not cause valve EJHV8811B to

open. An intra-cable hot short in cable 14EJG06BF combined with an inter-cable 120 VAC hot short on either conductor within 14EJG06BF will not cause the valve to open because ARA contacts are installed on both sides of the position switch contact. The ARA contacts prevent spurious operation of EJHV8811B if a fire occurs in this area.

Based on the above discussion, draindown of the RWST into the containment sump will not occur as a consequence of a fire in this area.

References: E-15000, XX-E-013, E-1F9205, E-13BN03, E-13BN03A, E-13EJ06A, E-13EJ06B, M-12BN01, M-12EJ01, M-10BN, DCP 13613, DCP 14325

5.2.16 Residual Heat Removal (RHR)

Note: For a discussion of the RHR mini-flow valves (EJFCV0610 and EJFCV0611), see Section 5.1.1. For a discussion of the RHR heat exchanger discharge control valves (EJHCV0606 and EJHCV0607), see Section 5.1.2. For a discussion of valves EJHV8804(A/B), see Section 5.2.20.

Cold shutdown mode of PFSSD requires RHR taking suction from the RCS. RHR pump suction from the RCS is controlled by valves BBPV8702A and EJHV8701A (Train A) and BBPV8702B and EJHV8701B (Train B). Both valves on the operating train must be open during cold shutdown.

Prior to transitioning to cold shutdown, either valve BBPV8702A or EJHV8701A and either BBPV8702B or EJHV8701B must be closed.

Hot Standby Evaluation

Cables associated with the safety interlocks on valves BBPV8702A and BBPV8702B are located in fire area A-8. These interlocks prevent premature opening of the BBPV valves when other valves are not in the closed position.

A fire-induced multiple simultaneous short within each cable will provide a false permissive that the associated valve is closed, and complete that portion of the open circuit. Relay K734 (low pressure permissive) contact is normally open in hot standby, which will ensure the valve will not open when RCS pressure is too high. However, as discussed in Section 5.1.5, pressure transmitter BBPT0405 and associated circuits are located in area A-8 and could send a false low RCS pressure and close the contact on relay K734. Therefore, operators should ensure the control room switches (BBHIS8702A and BBHIS8702B) are maintained in the closed position. Cables associated with the hand indicating switch (BBHIS8702A and BBHIS8702B) are not located in area A-8. Therefore, valves BBPV8702A and BBPV8702B will remain closed prior to transitioning to cold shutdown.

Cables associated with valves EJHV8701A and EJHV8701B are located in area A-8 and could be damaged in a manner that would cause the valves to open. However, since valves BBPV8702A and BBPV8702B can be maintained closed from the control room, the spurious opening of valves EJHV8701A and EJHV8701B is not a concern for PFSSD.

Cold Shutdown Evaluation

A fire in area A-8 could cause a loss of Train A CCW and the inability to operate Train A RHR. Therefore, Train B RHR is credited for a fire in area A-8.

Damage to any of the cables associated with BBPV8702A and BBPV8702B listed in Table A-8-4 could prevent opening the associated valve from the control room. Damage to cable 12BBI15NA associated with pressure transmitter BBPT0403 could send a false High-1 RCS

pressure signal and open the contacts on relay K734, which would prevent remote opening of valves BBPV8702A and BBPV8702B. Therefore, a fire in area A-8 may require a cold shutdown repair to be made within 72 hours per 10CFR50, Appendix R or a containment entry to manually open BBPV8702B when using RHR Train B.

Damage to any of the cables associated with EJHV8701A or EJHV8701B listed in Table A-8-4 could prevent opening the associated valve from the control room. Therefore, a fire in area A-8 may require a cold shutdown repair to be made within 72 hours per 10CFR50, Appendix R or a containment entry to manually open EJHV8701B when using RHR Train B.

The RHR pump discharge to RCS cold leg isolation valve (EJHV8809A or EJHV8809B) needs to be open on the operating train. Damage to cables 11EJG09CC and 11EJG09CD would likely result in valve EJHV8809A remaining in its as-is normally open position, which is the preferred PFSSD position. However, two proper intra-cable hot shorts in cable 11EJG09CD or one intra-cable hot short in cable 11EJG09CD combined with a short to ground on conductor 31 would spuriously close the valve.

Cable 11GLG05AA is the power cable for the RHR A room cooler SGL10A. Damage to this cable will prevent the RHR A room cooler from operating, and could impair the Train A RHR system. The B Train RHR room cooler is unaffected by a fire in area A-8.

Based on the above discussion, the Train A RHR system could be affected but the Train B RHR system is available in the event of a fire in area A-8. However, a cold shutdown repair or containment entry may be required to line up the RHR suction path from the RCS prior to initiating shutdown cooling.

References: E-15000, XX-E-013, E-1F9205, E-13BB12A, E-13BB12B, E-13EJ05A, E-13EJ05B, E-13EJ09A, E-13GL05, M-12BB01, M-12EJ01

5.2.17 Essential Service Water (ESW)

Essential Service Water provides various support functions to ensure PFSSD. Cables associated with Train A ESW are run through area A-8.

Power and control cables for normally closed valve EFHV0059 (CCW A to UHS return) are run through area A-8. This valve is required to remain closed for PFSSD. Locked and throttled valve EFV0058 bypasses valve EFHV0059 and is adjusted to provide the necessary flow for PFSSD. The power and control cables that run through area A-8 associated with EFHV0059 have no possible failures that could cause the valve to open. Therefore, there is reasonable assurance that valve EFHV0059 will not spuriously open due to a fire in area A-8.

Valves EFHV0031, EFHV0033, EFHV0045 and EFHV0049 are required to be open to ensure Train A ESW flow to the containment coolers. Control cables associated with these valves are run in area A-8. Damage to the cables could cause the spurious closure of the valves.

Cables associated with Train B ESW components are not run in area A-8 and are unaffected by a fire in A-8. Therefore, Train B ESW will be used for a fire in area A-8.

References: E-15000, XX-E-013, E-13EF04, E-13EF07, E-13EF08, E-13EF09, E-1F9403

5.2.18 Component Cooling Water (CCW)

Note: For a discussion of EGTV0029, see Section 5.1.7.

For PFSSD, the component cooling water (CCW) system is used to provide cooling to the centrifugal charging pump (CCP) oil cooler, seal water heat exchanger, the RHR heat exchanger and the RHR pump seal cooler. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Power and control cables (11EGG05AA, 11EGG05AB, 11EGG05CA and 11EGG05CB) for CCW A common header return isolation valve EGHV0015 and CCW A to nuclear auxiliary components valve EGHV0053 are run through area A-8. Hot shorts, open circuits and shorts to ground involving these cables will not cause the valves to spuriously operate. Damage to these cables could prevent operating these valves from the control room. If the Train A CCW system is operating at the time of the fire, the valves will be in the open position. If Train A off-site and on-site power is lost, it will be necessary to swap to Train B CCW and close EGHV0015 to prevent flow diversion from Train B CCW to Train A CCW.

Calculation M-EG-24 determines the amount of inventory lost from one train of CCW to the other train given a single failure of EGHV0015, EGHV0016, EGHV0053 or EGHV0054. The calculation also evaluates the impact on CCW pump NPSH given these failures. Based on the results of the calculation, there is no adverse impact on NPSH if a single failure occurs. In the case where both valves remain open, PFSSD is assured because, if EGHV0053 is open, check valve EGV0036 will prevent flow diversion from Train B to Train A CCW.

GLHZ0080 and GLHZ0081 are exhaust dampers on the Train A CCW pump room cooler (SGL11A). Cables 11GLY27AB and 11GLY27AD are associated with GLHZ0080 and GLHZ0081, respectively and are run in area A-8. Damage to these cables will prevent the CCW Train A room cooler dampers from functioning. This is acceptable based on PIR 2000-2646 and Calculation GL-M-006. CCW train B room coolers will provide sufficient cooling for continued operation of Train A pumps, or operations can switch to Train B pumps.

Based on the above discussion, Train B CCW is available to supply cooling water to Train B components if a fire occurs in area A-8.

References: E-15000, XX-E-013, E-13EG01A, E-13EG01B, E-13EG05A, E-13EG05B, E-13EG07, E-13GL27, E-1F9401A, M-12EG01, M-12EG02, Calculation GL-M-006, Calculation M-EG-24

5.2.19 Thermal Barrier Cooling

The Wolf Creek plant design provides two redundant methods of cooling the RCP seals, thermal barrier cooling using CCW and seal injection using the CCP. The PFSSD methodology at Wolf Creek requires tripping the RCPs and performing a natural circulation cooldown upon loss of both thermal barrier cooling (TBC) and seal injection. If only one method is lost, continued operation of the RCP is allowed by present established procedures until the other method can be re-established.

Valves EGHV0058, EGHV0071, EGHV0126 and EGHV0127 are used to control CCW flow to the RCPs. Valves EGHV0058 and EGHV0071 are normally open and valves EGHV0126 and EGHV0127 are normally closed. Cables 11EGG09AC and 11EGG09AD, associated with valve EGHV0058, are run in this area. Damage to these cables could cause the spurious closure of EGHV0058. If this occurs, bypass valve EGHV0127 can be opened from the control room to restore CCW flow to the RCPs. However, as stated below, CCW flow to the RCP thermal barriers may be affected by damage to other cables.

Power cable 14EGG09CA associated with valve EGHV0071 runs through area A-8. There is no feasible damage mechanism to this cable that can cause valve EGHV0071 to close. Control cable 14EGG09CB associated with valve EGHV0071 also runs through area A-8. Based on a circuit analysis, there is no feasible damage mechanism to this cable that can cause valve EGHV0071 to close.

Valves EGHV0061, EGHV0062, EGHV0132 and EGHV0133 are used to control thermal barrier cooling return flow at the exit from containment. Valves EGHV0061 and EGHV0062 are normally open and valves EGHV0132 and EGHV0133 are normally closed.

Power cable 11EGG09DA associated with valve EGHV0061 runs through area A-8. There is no feasible damage mechanism to this cable that can cause valve EGHV0061 to close. Control cable 11EGG09DB associated with valve EGHV0061 also runs through area A-8. Based on a circuit analysis, there is no feasible damage mechanism to this cable that can cause valve EGHV0061 to close. Valve EGHV0062 is unaffected by a fire in area A-8.

Valves BBHV0013, BBHV0014, BBHV0015 and BBHV0016 are located on the CCW return line from the RCP thermal barriers for RCPs A, B, C and D, respectively. Flow transmitters BBFT0017, BBFT0018, BBFT0019 and BBFT0020 are associated with valves BBHV0013, BBHV0014, BBHV0015 and BBHV0016, respectively. The flow transmitters monitor flow in the CCW piping and shut the valves on high CCW flow. Cables associated with these valves and flow transmitters are run in this area. Damage to the cables associated with the valves will not cause the valves to spuriously close. However, damage to the cables associated with the flow transmitter could cause a spurious high CCW flow signal and close the valves. Damage to the valve cables could prevent re-opening the valves. Therefore, thermal barrier cooling could be lost if a fire occurs in area A-8.

Cables 11EGI19AB and 14EGI19BB and associated flow transmitters EGFT0128 and EGFT0129, respectively, are located in fire area A-8. Damage to these cables and components could prevent operators from diagnosing a loss of CCW flow to the RCP thermal barriers. Operators should monitor BGFI0215B to ensure seal injection remains functional and take prompt action to start the credited charging pump if the operating charging pump fails.

Based on the above discussion, RCP thermal barrier cooling may be affected if a fire occurs in this area. RCP seal injection remains available.

References: E-15000, XX-E-013, E-13BB03, E-13BB28, E-13EG09, E-13EG09A, E-13EG10, E-13EG17A, E-13EG18A, E-13EG19, E-1F9303, M-12BB03, M-12EG03

5.2.20 Residual Heat Removal

PFSSD requires one train of residual heat removal (RHR) to be available for shutdown cooling. The RHR system is not used for hot standby.

Valve EGHV0101 is the Train A CCW to RHR Heat Exchanger control valve. Valve EGHV0102 is the Train B CCW to RHR Heat Exchanger control valve. These valves are normally closed during power operation. PFSSD requires that the valve on the operating train of CCW be closed until shutdown cooling mode is entered, at which time the valve on the operating train of RHR needs to be open. As stated in Section 5.2.18, the Train A CCW system may not be available to supply cooling water to the Train A RHR heat exchanger. Cables 11EGG07AA and 11EGG07AB associated with EGHV0101 are run in this area. Damage to these cables would not cause the spurious opening of the valve but could prevent opening the valve from the control room when needed. Valve EGHV0102 is unaffected by a fire in this area.

Normally closed valves EJHV8804A and EJHV8804B are located on the RHR heat exchanger discharge line and isolate flow to the suction side of the CCPs. During hot standby, these valves can fail in any position and not affect PFSSD, since the RHR system will not be operating. For cold shutdown, the valve on the operating RHR train must be closed to provide the proper permissives to open valves EJHV8701(A/B) and BBPV8702(A/B).

As stated previously, Train B RHR is credited for a fire in area A-8. Valve interlocks in the RHR system are discussed in Section 5.2.16. Other than the interlock circuit between EJHV8804B and EJHV8701B / BBPV8702B, there are no other circuits for valve EJHV8804B in area A-8. Therefore, valve EJHV8804B cannot spuriously open.

Cables 11EJG04AA and 11EJG04AB are associated with valve EJHV8804A. Damage to cable 11EJG04AA will not cause the valve to spuriously open. Since this is not a high-low interface boundary, consideration of a three-phase cable-to-cable hot short is not required.

Damage to cable 11EJG04AB will not cause the valve to spuriously open. Based on a review of the circuits associated with this valve, there are no failures or combinations of failures that could cause the valve to spuriously open.

Based on the above discussion, Train A RHR may be affected but Train B RHR is available.

References: E-15000, XX-E-013, E-13EG07, E-13EJ04A, E-13EJ04B, E-13EJ05A, E-13EJ05B, E-1F9205, M-12BB01, M-12BG03, M-12EJ01

5.2.21 Letdown Isolation Valves and Letdown Orifice Isolation Valves

Valves BGLCV0459 and BGLCV0460 are isolation valves installed in series on the inlet side of the regenerative heat exchanger. PFSSD requires that one of these valves be closed.

Cable 15BGK10AD is a control cable for the BGLCV0459 solenoid valve (BGHY0459). Cable 15BGK10BD is a control cable for the BGLCV0460 solenoid valve (BGHY0460). Air supplied by an open (energized) solenoid valve will open valve BGLCV0459 or BGLCV0460. A closed (de-energized) solenoid valve will cause loss of air pressure and close valves BGLCV0459 or BGLCV0460.

Either BGLCV0459 or BGLCV0460 must be closed or letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C must be closed. Cables for BGLCV0459 and BGLCV0460 are routed in a common enclosure in cable trays and conduit. An intra-cable hot short between conductors P1 and 1 on the cables could bypass the hand switches on RL001 and RP118A and cause the valves to remain open. Other cables routed in common cable trays have the proper voltage for hot shorts. The hot shorts bypass RL001 and RP118A hand switches for BGLCV0459 and BGLCV0460. BGLCV0459 and BGLCV0460 constitute a high/low pressure interface so multiple simultaneous hot shorts were considered.

Relays BGLCV0459X and BGLCV0460X will block power to the solenoid valve on BGLCV0459 and BGLCV0460, respectively, upon low level in the pressurizer. Cables associated with these relays do not run in area A-8. Also, as discussed in Section 5.2.9, pressurizer level transmitter BBLT0460 is unaffected by a fire in area A-8. Therefore, low level (17%) in the pressurizer will cause automatic closure of BGLCV0460, but the valve may re-open when level is established.

Letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C are listed as PFSSD components because of the interlock between these valves and BGLCV0459 and BGLCV0460. The interlock prevents closure of the letdown valves when any one or more orifice isolation valves are open. A cable associated with all three letdown orifice isolation valves is located in this fire area. Damage to these cables could prevent closure of the orifice

valves from the control room. As stated above, valve BGLCV0460 will automatically close upon low level in the pressurizer. Therefore, there is reasonable assurance that the letdown flow path will be isolated if a fire occurs in this area.

References: E-15000, XX-E-013, E-13BG10, E-13BG35, E-1R1343B, E-1R1343C, M-12BB02, M-12BG01

5.2.22 Boron Injection Tank Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

Cables associated with all four BIT inlet and outlet valves (EMHV8803A, EMHV8803B, EMHV8801A and EMHV8801B) are run in this area. Terminal box TB13209 contains cables associated with BIT outlet valve EMHV8801A. Damage to these cables could prevent the valves from being opened from the control room if the BIT flowpath is needed. Cables associated with EMHV8801B are run in conduit 114U3D5R which has been protected by a qualified 1-hour fire wrap. However, cables for the remaining valves are not protected. Therefore, the BIT flowpath may not be available if a fire occurs in area A-8.

Train B CCP is credited for a fire in area A-8 since circuits and support systems for Train A CCP may be affected by the fire. Also, based on the discussion in 5.2.21, a fire in area A-8 has the possibility to cause a momentary loss of inventory through the letdown flow path until the letdown isolation valves close automatically or are failed closed. As discussed in Section 5.2.21, automatic closure of BGLCV0460 is assured upon low level in the pressurizer. Reactor coolant pump seal injection remains available.

If the BIT flowpath is used, then the SIS test line is required to be isolated to prevent inventory loss. Valve EMHV8964 is an isolation valve that can be used to isolate the SIS test line. The PFSSD position of this valve is closed to prevent flow diversion through this flow path. Cable 11EMK12BA is a control cable for EMHV8964. A +125 VDC external (inter-cable) hot short in cable 11EMK12BA will energize the solenoid and open valve EMHV8964. The cable is routed in raceways with cables carrying the proper voltage and polarity. The hot short would bypass the control room hand switch (EMHIS8964) on RL017 and control of this valve from the control room would be lost. Redundant valves EMHV8871, EMHV8843 and EMHV8882 are unaffected by the fire and are available to ensure the SIS test line remains isolated.

Based on the above discussion, a fire in area A-8 will not adversely impact the ability to isolate the SIS test line flow path. Charging through the BIT is not required to achieve and maintain hot standby due to the availability of seal injection to maintain inventory and the automatic closure of BGLCV0460 upon low level in the pressurizer. However, the BIT flowpath may need to be aligned locally when transitioning to cold shutdown.

References: E-15000, XX-E-013, E-13EM02, E-13EM02A, E-13EM02B, E-13EM02C, E-13EM12, E-1F9302, E-1R1343B

5.2.23 Safety Injection Accumulator Isolation Valves

PFSSD requires isolation of the SI accumulators prior to reducing RCS pressure below the injection pressure to avoid unnecessary accumulator discharge. This is accomplished by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. These valves are normally open with the MCC breaker locked in the open position. Cables for valves EPHV8808A and EPHV8808C are run in area A-8 and are listed in Table A-8-4.

Since the breakers for these valves are normally open, damage to these cables will not cause the valve to spuriously change position. However, damage to the cables will prevent closing the associated valve from the control room after power is restored.

The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig. If necessary, a containment entry can be made to manually close the valves.

A fire in area A-8 may require a containment entry to close valves EPHV8808A and EPHV8808C if these valves are unresponsive from the control room.

References: E-15000, XX-E-013, M-12EP01, E-13EP02A, E-1F9201

5.2.24 Containment Coolers

PFSSD requires containment cooling to maintain the containment environment within EQ limits. Cables associated with Train A containment coolers are run in area A-8. These cables are listed in Table A-8-4.

Damage to these cables could prevent operation of the Train A containment coolers if a fire occurs in area A-8. However, circuits for the Train B containment coolers are run in a separate fire area and are unaffected by a fire in area A-8.

As discussed earlier, Train B ESW is available if a fire occurs in area A-8. Therefore, the Train B containment coolers will have the necessary service water flow to ensure proper operation.

Therefore, the Train B containment coolers will be used to provide containment cooling in the event of a fire in area A-8.

References: E-15000, XX-E-013, E-13GN02, E-13GN02A, M-12GN01, E-1F9441

5.2.25 Emergency Diesel Generators

A fire-induced loss of off-site power requires operation of a single emergency generator to supply power to essential loads. Calculation XX-E-013, Appendix 2 evaluates the probability of a loss of off-site power in each fire area in the plant.

Based on Calculation XX-E-013, a loss of off-site power could occur on the NB01 bus if a fire occurs in area A-8. Therefore, to ensure power to essential Train A components, the Train A emergency diesel generator would need to supply power to the NB01 bus.

Cables 11NEB01AA, 11NE01AC and 11NEB01AE are the phase A, B and C power cables from the Train A EDG to NB01. Damage to these cables will prevent the EDG from supplying NB01.

Cable 11JEG01AD is a control cable for Train A EDG fuel oil transfer pump PJE01A. Damage to the cable could prevent operation of the pump, which will prevent fuel transfer from the main storage tank to the day tank.

Based on the above discussion, power to NB01 could be lost. However, bus NB02 off-site and on-site power is available to supply PFSSD loads on Train B. A fire in area A-8 uses primarily Train B equipment, so PFSSD is not affected by the loss of NB01.

References: E-15000, XX-E-013, E-13JE01, E-13NE01, E-13NB01, E-13NB02, E-1F9425

5.2.26 480 VAC Power Distribution

A fire in area A-8 could damage cables associated with the Train A 480 VAC power distribution system. Cables 11NGG01AD and 11NGG01AE supply power from NG0107 to NG01BAF1. Damage to these cables could result in loss of power to Train A PFSSD components fed from NG01B. Drawing E-1F9424A identifies the Train A PFSSD loads associated with NG01B.

Cable 11NGG01AJ is the power cable for containment cooler SGN01A. Cable 11NGG01BF is the power cable for containment cooler SGN01C. As stated earlier, loss of containment coolers SGN01A and SGN01C will not prevent PFSSD due to the availability of the Train B containment coolers.

The loss of NG01B will not prevent PFSSD. Loss of power to the associated loads is acceptable due to the availability of Train B 480 VAC power from NG02 and NG04. None of the PFSSD equipment associated with NG01B is required if a fire occurs in area A-8.

References: E-15000, XX-E-013, E-03NG01A, E-1F9424B

5.2.27 Control Room Emergency Lights

Emergency lighting is provided in the control room to ensure adequate lighting during a station blackout and in the event a fire damages cables associated with the normal and standby lighting system. Emergency lights are supplied power from Class 1E 125 VDC breaker NK5120.

The control room has four sources of lighting; 1) Normal; 2) Standby; 3) Emergency; and Self-contained battery units. The normal lighting system is not evaluated in the PFSSD analysis and is assumed lost.

The standby lighting system is supplied by the 480 VAC Class 1E electrical system through breakers NG01AHF1 and NG01AHF2. Power availability on NG01AHF1 and NG01AHF2 is monitored by auxiliary relays 27XQB1 and 27XQB2 in panel RP330. Upon loss of power to

both NG01AHF1 and NG01AHF2, the relay coils are de-energized and the normally open contacts close. This energizes the contactor control relay which closes a contact and energizes the control room emergency lighting panel NK051A, which automatically illuminates the 125 VDC (QD System) emergency lights in the control room.

Cable 11QBY03CA is a control cable that runs from NK051 to RP330 and provides control power to energize the contactor control relay to illuminate control room emergency lights upon loss of Class 1E power. A short in this cable due to a fire will illuminate emergency lights in the control room even though Class 1E power is available. This will have no impact on PFSSD.

An open in cable 11QBY03CA will prevent the control room emergency lights from illuminating upon loss of Class 1E power. Based on Calculation XX-E-013, Appendix 2, A fire in area A-8 could result in the loss of Train A off-site power and Train A emergency diesel generator. Therefore, the possibility exists for a fire in area A-8 to result in a loss of normal, standby and emergency lighting in the control room.

Self-contained Appendix R battery units are provided in the control room to provide minimum lighting for post-fire safe shutdown. Three units are provided in the front panel area, each with two light heads, to provide illumination on the main control boards. Two additional units are provided in the corridor area and two units are provided in the back panel area, each with two light heads. The Appendix R battery units are capable of providing minimum illumination for 8 hours, during which time action can be taken by maintenance to restore the normal or standby lighting system. Operations has indicated that installed Appendix R lights are sufficient to perform control room actions to achieve hot standby.

Based on the above discussion, the control room will have sufficient lighting to achieve and maintain PFSSD.

References: E-15000, XX-E-013, E-03NG01, E-093-00064, E-11NK01, E-13NB03, E-13QB03, E-13QD01, E-1L3604, E-1L8900, E-1R3613,

5.2.28 Reactor Trip Switchgear Cabinet SB102A

Cables associated with Train A reactor trip switchgear are located in fire area A-8. Cable 11SBS10AB is a power cable for SB102A from NK04116. Cable 11SBS12AC is a control cable from SB102A to RL003.

A fire in this area could damage these cables and affect the capability to trip the reactor using SB102A. However, redundant reactor trip switchgear cabinet SB102B is available and is unaffected by a fire in area A-8.

References: E-15000, XX-E-013, E-11NK01, E-13SB10, E-13SB12A, E-13SB12B

5.2.29 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B. Cables run in fire area A-8 associated with these monitors are listed in Table A-8-4. Cables for SENY0060A/B run in area A-8. Cables for SENE0031, SENE0032 and do not run in area A-8 and are unaffected by a fire in area A-8.

Cable 14SES07BB is an indication circuit associated with SR monitor SENY0061A/B used for alternate PFSSD at remote shutdown panel RP118B. This cable is run in area A-8. A fire in this area does not use remote shutdown panel RP118B. Damage to this cable will not impact SR indication in the control room at panel RL020. Therefore, SR monitoring is available for a fire in area A-8 using SENY0061A/B.

Source range monitoring is available for a fire in area A-8 using SR monitors SENE0031, SENE0032, and SENY0061A/B. For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013, Attachment 3.

References: E-15000, XX-E-013, E-13SE01, E-13SE02, E-13SE07, E-13SR14, E-1F9101

5.2.30 Non-Class 1E 125 VDC Battery Charger PK22

Cable 16PKG11BA is the 480 VAC power cable from NG0409 to 125 VDC battery charger PK22. Damage to this cable could result in a loss of the PK22 power feed to 125 VDC bus PK02. PK02 supplies 125 VDC power to essential PFSSD loads on the Train B system.

Redundant power feed to the PK02 bus is unaffected by a fire in area A-8. This power feed originates from 125 VDC battery group PK12, and is normally aligned to feed power to PK02 in the event PK22 is lost.

Based on the above discussion, a fire in area A-8 could result in a loss of power to PK22 but redundant power source PK02 is available and is unaffected by the fire.

References: E-15000, XX-E-013, E-11PK02, E-13PK11, E-1F9422C

5.2.31 Normal Pressurizer Spray

The normal pressurizer spray valves are included in the PFSSD design because spurious operation of pressurizer sprays can cause a decrease in pressure which can lead to boiling in the core. The pressurizer spray valves are part of the pressurizer pressure control system.

The pressurizer normal spray valves (BBPCV0455B and BBPCV0455C) operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

Cable 11BBI16KB associated with BBPT0455 is run in this area. Damage to this cable could cause a spurious high-pressure signal. As discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure input channel will not cause the spurious operation of the pressurizer spray valves due to the Ovation 4-channel validation logic, which uses the 2nd highest signal as the validated signal and has built-in logic to detect and ignore a failed input.

Based on the above discussion, pressurizer spray valves will not spuriously open if a fire occurs in this area.

References: E-15000, XX-E-013, E-13BB16, E-13BB19, M-744-00028, M-761A-00063, DCP 13324

5.2.32 Containment Air Supply

Valve KAFV0029 is an isolation valve on the containment compressed air supply line. This valve is credited for PFSSD in the event of a fire in certain areas to isolate air to letdown isolation valves BGLCV0459 and BGLCV0460 and pressurizer spray valves BBPCV0455B and BBPCV0455C to fail the valves closed. Valve KAFV0029 is a diverse means of closing these valves if the fire prevents closing the valves using their respective control room hand switches.

Cable 11KAK02AA is a control cable associated with valve KAFV0029. Damage to this cable could prevent closure of the valve from the control room or could cause the valve to spuriously close. If the valve spuriously closes, PFSSD will not be affected as documented in WIP-E-1F9900-004-A-1.

A fire in area A-8 does not require closure of the air supply to containment to achieve PFSSD. Letdown isolation valves BGLCV0459 and BGLCV0460 are unaffected by a fire in this area and can be closed from the control room to isolate letdown. As stated in Section 5.2.31, pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open in the event of a fire in this area but actions are available from the control room to close the valves.

Based on the above discussion, damage to cable 11KAK02AA will have no adverse impact on the ability to achieve and maintain safe shutdown following a fire in this area.

References: E-15000, XX-E-013, E-13KA02, WIP-E-1F9900-004-A-1

5.2.33 Control Room A/C Units

A control cable associated with Train A control room A/C unit SGK04A is run in area A-8. Damage to this cable could prevent operation of SGK04A.

Cables associated with Train B control room A/C unit SGK04B and associated dampers are run in a different fire area and are unaffected by a fire in area A-8. Therefore, control room A/C is available if a fire occurs in area A-8.

References: E-15000, XX-E-013, E-13GK02B, M-12GK01

5.2.34 Load Center Feeder Breakers PA0105, PA0106 and PA0206

Load center feeder breakers PA0105, PA0106 and PA0206 are credited for PFSSD because they supply power to credited non-safety related loads. Cables associated with these breakers run in this area. PFSSD impact due to damage to these cables is discussed below.

Cable 15PGA10AA is a control cable associated with breaker PA0105. An intra-cable hot short in this cable will trip PA0105. Breaker PA0105 supplies power to the following PFSSD components:

- PG11JFR2 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0031
- PG11KBR3 – Auxiliary Steam System Control Valve FBHV0081

PG11JFR2 and PG11KBR3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using hand switch ABHS0079. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Cables 15PGA10BA and 15PGA10BB are control cables associated with breaker PA0106. An intra-cable hot short in these cables will trip PA0106. Cable 15PGG02AC supplies power from PG1900 to PG1700. PG1700 is not credited for PFSSD but a fault on this cable could open breaker PA0106. Breaker PA0106 supplies power to the following PFSSD components:

- PG19GCR217 – MCB Misc. Power Circuits RL023
- PG19GFR3 – Instr. Bus Transformer Alt. Feed XPN07D

See Section 5.1.2 for discussion on loss of these components.

Cable 16PGA10CA is a control cable associated with breaker PA0206. An intra-cable hot short in this cable will trip PA0206. Breaker PA0206 supplies power to the following PFSSD components:

- PG12KAF4 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0032

- PG12KAF5 – Main Steam Supply to Steam Seals Valve ABHV0046
- PG12KEF3 – Auxiliary Steam System Control Valve FBHV0080

PG12KAF4, PG12KAF5 and PG12KEF3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using hand switch ABHS0079. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Based on the above discussion and the discussion in Section 5.1.2, loss of breakers PA0105, PA0106 and PA0206 will not adversely affect PFSSD.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-13PG02, E-13PG10, E-1F9424E, E-1F9425, KD-7496

5.2.35 Non-Class 1E 125 VDC Battery Charger PK24

Cable 16PKG13AA is the 480 VAC power cable from NG0410 to 125 VDC battery charger PK24. Damage to this cable could result in a loss of the PK24 power feed to 125 VDC bus PK04. PK04 supplies 125 VDC power to 10 kVA inverter PN04, which supplies backup 120 VAC power to RP043 and primary 120 VAC power to RP047.

Redundant power feed to the PK04 bus is unaffected by a fire in area A-8. This power feed originates from 125 VDC battery group PK14 and is normally aligned to feed power to PK04 in the event PK24 is lost.

Based on the above discussion, a fire in area A-8 could result in a loss of power to PK24 but redundant power source PK14 is available and is unaffected by the fire. In addition, redundant power to panels RP043 and RP047 is available from PN310. Therefore, 120 VAC power to panels RP043 and RP047 is available if a fire occurs in fire area A-8.

References: E-15000, XX-E-013, E-11NG02, E-11PK04, E-13PK13, E-1F9421, E-1F9422C

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1.0 GENERAL AREA DESCRIPTION

Fire area A-9 is located on the 2000 elevation of the Auxiliary Building and includes the rooms listed in Table A-9-1.

Table A-9-1
Rooms Located in Fire Area A-9

ROOM #	DESCRIPTION
1309	Train B RHR Heat Exchanger Room

Fire area A-9 has no automatic suppression or detection installed. The area is separated from adjacent areas by minimum 3-hour fire rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-9-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-9-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-9

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
EJ	Residual Heat Removal System	M, H, P	Train B RHR discharge control valve EJHCV0607 could be affected. Train A RHR is unaffected.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.

Table A-9-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-9

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.

Table A-9-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-9			
System	**System Name**	**PFSSD Function***	**Comments**
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.

Table A-9-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-9			
System	**System Name**	**PFSSD Function***	**Comments**
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-9.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-9. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-9.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-9

PFSSD components (S. in E-15000) located in fire area A-9 are shown in Table A-9-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-9-3.

Table A-9-3
PFSSD Equipment Located in Fire Area A-9

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1309	EJHCV0607	Train B RHR Heat Exchanger Discharge Control Valve	5.1.1	
1309	EJHY0607	EJHCV0607 Valve Positioner	5.1.1	

5.1.1 Residual Heat Removal

The decay heat removal function requires an available RHR flowpath taking suction from the RCS and discharging cooled water back to the RCS. RHR Train B discharge control valve EJHCV0607 and associated valve positioner and cable are located in this fire area. Damage to this cable and/or associated components due to a fire could cause spurious operation of EJHCV0607 and could prevent operation of the Train B RHR system.

The Train A RHR system is unaffected by a fire in fire area A-9. Therefore, the decay heat removal function is satisfied if a fire occurs in area A-9.

References: E-15000, XX-E-013, E-13EJ12, E-1F9205, M-12EJ01

5.2 PFSSD CABLE EVALUATION

Table A-9-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-9. The applicable evaluation section is also listed in Table A-9-4.

Table A-9-4
PFSSD Cables Located in Fire Area A-9

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16EJI12BA	1309	EJHCV0607	I	5.1.1	RHR heat exchanger outlet control valve

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1.0 GENERAL AREA DESCRIPTION

Fire area A-10 is located on the 2000 elevation of the Auxiliary Building and includes the rooms listed in Table A-10-1.

Table A-10-1
Rooms Located in Fire Area A-10

ROOM #	DESCRIPTION
1310	Train A RHR Heat Exchanger Room

Fire area A-10 has no automatic suppression or detection installed. The area is separated from adjacent areas by minimum 3-hour fire rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-10-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-10-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-10

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
EJ	Residual Heat Removal System	M, H, P	Train A RHR discharge control valve EJHCV0606 could be affected. Control of Train A RHR to charging pumps valve EJHV8804A could be lost. Train B RHR is unaffected.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.

Table A-10-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-10

System	System Name	PFSSD Function*	Comments
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.

Table A-10-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-10

System	System Name	PFSSD Function*	Comments
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.

Table A-10-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-10			
System	**System Name**	**PFSSD Function***	**Comments**
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-10.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-10. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-10.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-10

PFSSD components (S. in E-15000) located in fire area A-10 are shown in Table A-10-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-10-3.

Table A-10-3
PFSSD Equipment Located in Fire Area A-10

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1310	EJHCV0606	Train A RHR Heat Exchanger Discharge Control Valve	5.1.1	
1310	EJHV8804A	RHR A to CVCS CCP Isolation Valve	5.1.1	
1310	EJHY0606	EJHCV0606 Valve Positioner	5.1.1	
1310	EJZS8804A	RHR A to CVCS CCP Isolation Valve Position Switch	5.1.1	

5.1.1 Residual Heat Removal

The decay heat removal function requires an available RHR flowpath taking suction from the RCS and discharging cooled water back to the RCS. During normal operation and hot standby, the RHR system is not required and the RCS to RHR suction isolation valves must remain closed.

Train A RHR discharge control valve EJHCV0606 and associated valve positioner (EJHY0606) and cable (15EJI12AA) are located in this fire area. Damage to this cable and/or associated components due to a fire could cause spurious operation of EJHCV0606 and could prevent operation of the Train A RHR system.

Valve EJHV8804A and associated power and control cables are run in fire area A-10. Valve EJHV8804A is required to remain closed for PFSSD when operating the Train A RHR system to prevent flow diversion from the RCS to the CVCS. Damage to cables 11EJG04AA and 11EJG04AB will not cause the valve to spuriously open but could prevent operation of this valve from the control room. Therefore, valve EJHV8804A will remain closed during the fire.

Position switch EJZS8804A is part of the open circuit on Train A RCS to RHR suction valve BBPV8702A. During normal operation valve BBPV8702A is closed with the breaker padlocked in the off position per CKL BB-110. Damage to cable 14BBG12AC could provide a false open permissive but valve BBPV8702A will not open because other contacts in the circuit will remain open and the valve breaker is normally in the off position. The valve is a high-low pressure interface valve so consideration of proper polarity three-phase hot shorts is required. The power cables for this valve are not run in this area. Therefore, a fire in this area will not cause the spurious opening of BBPV8702A.

Cable 11EJG05AF is part of the open circuit on Train A RCS to RHR suction valve EJHV8701A. During normal operation valve EJHV8701A is closed with the breaker padlocked in the off position per CKL EJ-120. A hot short in this cable will provide a false open permissive but valve EJHV8701A will not open because other contacts in the circuit will remain open and the valve breaker is normally in the off position. The valve is a high-low pressure interface valve so consideration of proper polarity three-phase hot shorts is required. The power cables for this valve are not run in this area. Therefore, a fire in this area will not cause the spurious opening of EJHV8701A.

The Train B RHR system is unaffected by a fire in fire area A-10. Therefore, the decay heat removal function is satisfied using Train B RHR if a fire occurs in area A-10.

References: E-15000, XX-E-013, E-13BB12A, E-13EJ04A, E-13EJ05A, E-13EJ12, E-1F9205, M-12BB01, M-12EJ01, SCA 02-0198, CKL BB-110, CKL EJ-120

5.2 PFSSD CABLE EVALUATION

Table A-10-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-10. The applicable evaluation section is also listed in Table A-10-4.

Table A-10-4 **PFSSD Cables Located in Fire Area A-10**					
Cable #	**Location**	**Primary PFSSD Equipment**	**Cable Function** (P) Power (C) Control (I) Instrumentation	**Evaluation Section**	**Comments**
11EJG04AA	1310	EJHV8804A	P	5.1.1	RHR A to CVCS CCP Isolation Valve
11EJG04AB	1310	EJHV8804A	C	5.1.1	RHR A to CVCS CCP Isolation Valve
11EJG05AF	1310	EJHV8701A	C	5.1.1	EJHV8804A Interlock
14BBG12AC	1310	BBPV8702A	C	5.1.1	EJHV8804A Interlock
15EJI12AA	1310	EJHCV0606	I	5.1.1	RHR heat exchanger outlet control valve

FIRE AREA A-11

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-11 is located on the 2000 elevation of the Auxiliary Building and includes the rooms listed in Table A-11-1.

Table A-11-1
Rooms Located in Fire Area A-11

ROOM #	DESCRIPTION
1335	North Electrical Chase - 2000 Elevation

Fire area A-11 is protected with an automatic wet-pipe sprinkler system. In addition, automatic fire detection is installed throughout. The automatic suppression and detection system meets the requirements of 10CFR50, Appendix R, Section III.G.2.c.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-11-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-11-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-11

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11. ABPT0516 and ABPT0546 are available to provide indication of cooldown on RCS loops 1 and 4.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
AE	Main Feedwater	H, P	Steam Generator A wide range level on AELI0501 may be affected. The separation group 1 (Train A) narrow range level transmitter on each steam generator could be affected. The remaining wide range and narrow range level transmitters are unaffected.
AL	Aux. Feedwater System	H, P	Train A motor driven auxiliary feedwater pump (MDAFP) may not be available. Train B motor driven auxiliary feedwater pump and the turbine driven auxiliary feedwater pump (TDAFP) are available. Cables associated with Train A MDAFP to Steam Generators (SGs) B and C control valves ALHV0009 and ALHV0011 may be affected. All remaining auxiliary feedwater pump supply and discharge valves are unaffected.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
BB	Reactor Coolant System	R, M, H, P, S	RCS wide range hot and cold leg temperature elements BBTE0413B (WR HL Loop 1) and BBTE0443A (WR CL Loop 4), as well as ABPT0516 and ABPT0546, will provide indication of cooldown on RCS loops 1 and 4. Pressurizer pressure indication is available using BBPI0456, BBPI0457 and BBPI0458. Pressurizer level indication is available using BBLI0460A. Reactor head vent flowpath is isolated by maintaining valve BBHV8002A and either head vent valve BBHV8001B or BBHV8002B closed. RCP thermal barrier cooling could be affected due to spurious closure of BBHV0013, BBHV0014, BBHV0015 and BBHV0016. Reactor coolant pumps A and B may not stop using the control room hand switch. RCP seal injection remains available. Therefore, the inability to stop the RCPs will have no adverse impact on PFSSD. Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, pressurizer spray can be stopped by closing KAFV0029 using KAHIS0029 in the main control room.
BG	Chemical and Volume Control System	R, M, S	Valve BGHV8106 may fail to close from the control room. Valve BGHV8105 is unaffected by the fire and can be closed from the control room using BGHIS8105. Valves BGHV8153A and either BGHV8153B or BGHV8154B are maintained closed to isolate excess letdown. Letdown isolation valves BGLCV0459 and BGLCV0460 and letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C may need to be failed closed by closing valve KAFV0029 using KAHIS0029 in the main control room.

Table A-11-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-11

System	System Name	PFSSD Function*	Comments
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blowdown system are satisfied. Steam generator blowdown is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A, located on the RL024 panel in the main control room.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
EF	Essential Service Water System	H, S	The ESW supply to the Train A containment coolers may be affected. ESW supply to Train B containment coolers is unaffected.
EG	Component Cooling Water System	S	CCW flow to the RCP thermal barriers could be affected. Seal injection remains available to ensure RCP seal cooling. CCW flow indicators EGFI0128 and EGFI0129 are unaffected.
EJ	Residual Heat Removal System	M, H, P	Valve EJHV8811A could spuriously open but valve BNHV8812A will automatically close when EJHV8811A is fully open. If EJHV8811A does not fully open, then BNHV8812A can be closed using BNHIS8812A in the control room. Train A RHR components are affected by the fire. Train B RHR is unaffected and remains available for shutdown cooling. However, it may be necessary to manually open EJHV8701B to provide a suction source to the Train B RHR pump.
EM	High Pressure Coolant Injection	R, M	The Train A BIT flowpath may not be available. Charging through the BIT is available using the B CCP flowing through valves EMHV8803B and EMHV8801B. Valves EMHV8882 and EMHV8964 may spuriously open. Redundant valve EMHV8871 will remain closed to isolate the SI Test line.
EN	Containment Spray	R, M	Train A containment spray isolation valve ENHV0006 could spuriously open. A spurious CSAS is not credible for a fire in this area and the Train A containment spray pump will not spuriously start. Therefore, spurious opening of ENHV0006 will not result in an actual containment spray.
EP	Safety Injection Accumulators	H	A containment entry may be required to close valves EPHV8808A and EPHV8808C.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.

Table A-11-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-11

System	System Name	PFSSD Function*	Comments
GF	AFW Pump Room Coolers	S	Train A AFW pump room cooler SGF02A may be affected. Train B AFW pump room cooler SGF02B is unaffected.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
GN	Containment Coolers	S	Train A containment coolers may be affected. Train B containment coolers are unaffected.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.

Table A-11-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-11

System	System Name	PFSSD Function*	Comments
NG	480V Load Centers and MCCs	S	Train A 480 VAC motor control center NG01B may not be available. However, redundant Train B 480 VAC load centers NG02 and NG04 remain available to supply Train B motor control centers.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.

Table A-11-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-11

System	System Name	PFSSD Function*	Comments
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-11.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-11. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 RWST Draindown to Containment Sump

Valve EJHV8811A may spuriously open, allowing water from the RWST to drain to the sump. If the valve opens fully, valve BNHV8812A will automatically close, as designed. However, if EJHV8811A partially opens, then BNHV8812A will not automatically close. In this case, if a decreasing RWST inventory is observed, close BNHV8812A using BNHIS8812A on RL017.

3.2.2 Normal Pressurizer Spray

Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, the spray can be stopped by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer pressure indication is available using BBPI0456, BBPI0457 and BBPI0458.

3.2.3 Isolation of Letdown

A fire in area A-11 could prevent valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B, and BGHV8149C from being closed using their associated control room hand switches. If this occurs, the valves can be closed by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer level indication is available using BBLI0460A.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR

Valve EJHV8701B may need to be manually opened when initiating Train B RHR for cold shutdown.

3.3.2 SI Accumulators

A fire in area A-11 may require a containment entry to close SI Accumulator injection valves EPHV8808A and EPHV8808C if these valves are unresponsive from the control room. The SI accumulators need to be isolated for cold shutdown, prior to the RCS reaching 1000 psig.

4.0 CONCLUSION

Redundant post fire safe shutdown capability, unaffected by a severe design basis fire, does not exist in area A-11. However, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-11.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-11

There are no PFSSD components (S. in E-15000) located in fire area A-11. Fire area A-11 is an electrical chase containing only cables.

5.2 PFSSD CABLE EVALUATION

Table A-11-3 lists all the PFSSD cables (S. in E-15000) located in fire area A-11. The applicable evaluation section is also listed in Table A-11-3.

Table A-11-3
PFSSD Cables Located in Fire Area A-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11AEI08AB	1335	AELT0501	I	5.2.1	SG A Wide Range Level Transmitter
11AEI08BB	1335	AELT0529	I	5.2.1	SG B Narrow Range Level Transmitter
11AEI08CB	1335	AELT0539	I	5.2.1	SG C Narrow Range Level Transmitter
11AEI12AB	1335	AELT0551	I	5.2.1	SG A Narrow Range Level Transmitter
11AEI12DB	1335	AELT0554	I	5.2.1	SG D Narrow Range Level Transmitter
11ALY09CD	1335	ALHV0009	C	5.2.2	Train A MDAFP to SG B Iso Valve
11ALY09CE	1335	ALHV0009	P	5.2.2	Train A MDAFP to SG B Iso Valve
11ALY09DD	1335	ALHV0011	C	5.2.2	Train A MDAFP to SG C Iso Valve
11ALY09DE	1335	ALHV0011	P	5.2.2	Train A MDAFP to SG C Iso Valve
11BBG03AA	1335	BBHV0013	P	5.2.11	RCP A Thermal Barrier Return Iso Valve
11BBG03AB	1335	BBHV0013	C	5.2.11	RCP A Thermal Barrier Return Iso Valve
11BBG03BA	1335	BBHV0014	P	5.2.11	RCP B Thermal Barrier Return Iso Valve
11BBG03BB	1335	BBHV0014	C	5.2.11	RCP B Thermal Barrier Return Iso Valve
11BBG03CA	1335	BBHV0015	P	5.2.11	RCP C Thermal Barrier Return Iso Valve
11BBG03CB	1335	BBHV0015	C	5.2.11	RCP C Thermal Barrier Return Iso Valve
11BBG03DA	1335	BBHV0016	P	5.2.11	RCP D Thermal Barrier Return Iso Valve
11BBG03DB	1335	BBHV0016	C	5.2.11	RCP D Thermal Barrier Return Iso Valve
11BBG39AC	1335	BBHV8000A	C	5.2.3	Pressurizer PORV Block Valve
11BBG39AF	1335	BBHV8000A	C	5.2.3	Pressurizer PORV Block Valve
11BBG39AJ	1335	BBHV8000A	C	5.2.3	Pressurizer PORV Block Valve
11BBI15HB	1335	BBTE0413A	I	5.2.4	RCS Hot Leg Temp (WR) Loop 1
11BBI15JB	1335	BBTE0423A	I	5.2.4	RCS Hot Leg Temp (WR) Loop 2
11BBI15KB	1335	BBTE0443B	I	5.2.4	RCS Cold Leg Temp (WR) Loop 4

Table A-11-3
PFSSD Cables Located in Fire Area A-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BBI15LB	1335	BBTE0433B	I	5.2.4	RCS Cold Leg Temp (WR) Loop 3
11BBI16KB	1335	BBPT0455	I	5.2.3 5.2.5 5.2.22	Pressurizer Pressure Transmitter
11BBI16PB	1335	BBLT0459	I	5.2.6	Pressurizer Level Transmitter (NR)
11BBI28AA	1335	BBFT0017	I	5.2.11	BBHV0013 Flow Control
11BBI28BA	1335	BBFT0018	I	5.2.11	BBHV0014 Flow Control
11BBI28CA	1335	BBFT0019	I	5.2.11	BBHV0015 Flow Control
11BBI28DA	1335	BBFT0020	I	5.2.11	BBHV0016 Flow Control
11BBK30AA	1335	BBHV8001A	C	5.2.7	Reactor Vessel Head Vent Valve
11BBK40AG	1335	BBPCV0455A	P	5.2.3	PZR Power Operated Relief Valve
11BBK40AJ	1335	BBPCV0455A	C	5.2.3	PZR Power Operated Relief Valve
11BGG11BA	1335	BGHV8106	P	5.2.8	Charging Pumps to Regenerative HX Iso
11BGG11BB	1335	BGHV8106	C	5.2.8	Charging Pumps to Regenerative HX Iso
11BGG11BC	1335	BGHV8106	C	5.2.8	Charging Pumps to Regenerative HX Iso
11BGK48DB	1335	BGHV8154A	C	5.2.9	Excess Letdown Iso Valve
11EFG07AA	1335	EFHV0031	P	5.2.10	ESW A to CTMT Air Coolers Iso Valve
11EFG07AB	1335	EFHV0031	C	5.2.10	ESW A to CTMT Air Coolers Iso Valve
11EFG07AC	1335	EFHV0031	C	5.2.10	ESW A to CTMT Air Coolers Iso Valve
11EFG08AA	1335	EFHV0049	P	5.2.10	ESW A to CTMT Air Coolers Iso Valve
11EFG08AB	1335	EFHV0049	C	5.2.10	ESW A to CTMT Air Coolers Iso Valve
11EFG08AC	1335	EFHV0049	C	5.2.10	ESW A to CTMT Air Coolers Iso Valve
11EFG09AC	1335	EFHV0033	C	5.2.10	ESW A to CTMT Air Coolers Iso Valve

Table A-11-3
PFSSD Cables Located in Fire Area A-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EFG09CC	1335	EFHV0045	C	5.2.10	ESW A to CTMT Air Coolers Iso Valve
11EGG09AA	1335	EGHV0058	P	5.2.11	CCW HX to RCS Iso Valve
11EGG09AB	1335	EGHV0058	C	5.2.11	CCW HX to RCS Iso Valve
11EGG09AC	1335	EGHV0058	C	5.2.11	CCW HX to RCS Iso Valve
11EGG09AD	1335	EGHV0058	C	5.2.11	CCW HX to RCS Iso Valve
11EGG09DA	1335	EGHV0061	P	5.2.11	CCW Return From RCP Thermal Barrier
11EGG09DB	1335	EGHV0061	C	5.2.11	CCW Return From RCP Thermal Barrier
11EGG17BA	1335	EGHV0132	C	5.2.11	Thermal Barrier CCW Return HV-62 Bypass
11EGG17BB	1335	EGHV0132	C	5.2.11	Thermal Barrier CCW Return HV-62 Bypass
11EGG18AA	1335	EGHV0126	P	5.2.11	CCW HX to RCS HV-71 Bypass
11EGG18AB	1335	EGHV0126	C	5.2.11	CCW HX to RCS HV-71 Bypass
11EGG18AC	1335	EGHV0126	C	5.2.11	CCW HX to RCS HV-71 Bypass
11EGG18AD	1335	EGHV0126	C	5.2.11	CCW HX to RCS HV-71 Bypass
11EJG05AC	1335	EJHV8701A	C	5.2.12	RCS Hot Leg 1 to RHR Pump A Suction
11EJG05AF	1335	EJHV8701A	C	5.2.12	RCS Hot Leg 1 to RHR Pump A Suction
11EJG05AG	1335	EJHV8701A	C	5.2.12	RCS Hot Leg 1 to RHR Pump A Suction
11EJG05AJ	1335	EJHV8701A	C	5.2.12	RCS Hot Leg 1 to RHR Pump A Suction
11EJG05AK	1335	EJHV8701A	C	5.2.12	RCS Hot Leg 1 to RHR Pump A Suction
11EJG05BC	1335	EJHV8701B	C	5.2.12	RCS Hot Leg 4 to RHR Pump B Suction
11EJG05BF	1335	EJHV8701B	C	5.2.12	RCS Hot Leg 4 to RHR Pump B Suction
11EJG05BG	1335	EJHV8701B	C	5.2.12	RCS Hot Leg 4 to RHR Pump B Suction
11EJG05BJ	1335	EJHV8701B	C	5.2.12	RCS Hot Leg 4 to RHR Pump B Suction
11EJG05BK	1335	EJHV8701B	C	5.2.12	RCS Hot Leg 4 to RHR Pump B Suction

Table A-11-3
PFSSD Cables Located in Fire Area A-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EJG06AC	1335	EJHV8811A	C	5.2.13	CTMT Recirc Sump to RHR Pump A
11EJG06AJ	1335	EJHV8811A	P	5.2.13	CTMT Recirc Sump to RHR Pump A
11EJG06AK	1335	EJHV8811A	C	5.2.13	CTMT Recirc Sump to RHR Pump A
11EJG06AU	1335	EJHV8811A	C	5.2.13	CTMT Recirc Sump to RHR Pump A
11EJG09CA	1335	EJHV8809A	P	5.2.14	RHR to ACCUM INJ Loops 1 & 2 Iso Vlv
11EJG09CB	1335	EJHV8809A	C	5.2.14	RHR to ACCUM INJ Loops 1 & 2 Iso Vlv
11EJG09CC	1335	EJHV8809A	C	5.2.14	RHR to ACCUM INJ Loops 1 & 2 Iso Vlv
11EJG09CD	1335	EJHV8809A	C	5.2.14	RHR to ACCUM INJ Loops 1 & 2 Iso Vlv
11EMG02AA	1335	EMHV8803A	P	5.2.15	Charging Pump Disch HDR to BIT Iso
11EMG02AB	1335	EMHV8803A	C	5.2.15	Charging Pump Disch HDR to BIT Iso
11EMG02AC	1335	EMHV8803A	C	5.2.15	Charging Pump Disch HDR to BIT Iso
11EMG02CA	1335	EMHV8801A	P	5.2.15	BIT Outlet ISO
11EMG02CB	1335	EMHV8801A	C	5.2.15	BIT Outlet ISO
11EMG02CE	1335	EMHV8801A	C	5.2.15	BIT Outlet ISO
11EMK12BA	1335	EMHV8964	C	5.2.15	SI Test Line System Outside CTMT Iso Vlv
11ENG03AA	1335	ENHV0006	P	5.2.5	Train A Containment Spray Isolation Valve
11ENG03AB	1335	ENHV0006	C	5.2.5	Train A Containment Spray Isolation Valve
11ENG03AC	1335	ENHV0006	C	5.2.5	Train A Containment Spray Isolation Valve
11ENG03AD	1335	ENHV0006	C	5.2.5	Train A Containment Spray Isolation Valve
11EPG02AE	1335	EPHV8808A	C	5.2.16	Accumulator Tank A Outlet Iso Valve
11EPG02BE	1335	EPHV8808C	C	5.2.16	Accumulator Tank C Outlet Iso Valve
11GFG01AA	1335	DSGF02A	P	5.2.2	AFW Pump A Room Cooler
11GFG01AB	1335	DSGF02A	C	5.2.2	AFW Pump A Room Cooler

Table A-11-3
PFSSD Cables Located in Fire Area A-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GFG01AC	1335	DSGF02A	C	5.2.2	AFW Pump A Room Cooler
11GNG02AD	1335	DSGN01A	C	5.2.10	Train A Containment Cooler
11GNG02AH	1335	DSGN01A	C	5.2.10	Train A Containment Cooler
11GNG02CD	1335	DSGN01C	C	5.2.10	Train A Containment Cooler
11GNG02CH	1335	DSGN01C	C	5.2.10	Train A Containment Cooler
11GNI05AA	1335	GNPT0937	I	5.2.5	Containment Pressure Transmitter
11NGG01AD	1335	NG00107	P	5.2.17	NG001B Feeder Breaker
11NGG01AE	1335	NG00107	P	5.2.17	NG001B Feeder Breaker
11NGG01AJ	1335	NG00108	P	5.2.17	DSGN01A Containment Cooler Breaker
11NGG01BF	1335	NG00305	P	5.2.17	DSGN01C Containment Cooler Breaker
11PNG01AE	1335	XPN07A	P	5.2.18	PN System Transformer
15BBA01AE	1335	DPBB01A	C	5.2.21	Reactor Coolant Pump A Motor
15BBA01BE	1335	DPBB01B	C	5.2.21	Reactor Coolant Pump B Motor
15BBI19AA	1335	BBPCV0455B	I	5.2.22	Pressurizer Spray Valve
15BBI19BA	1335	BBPCV0455C	I	5.2.22	Pressurizer Spray Valve
15BGK10AA	1335	BGLCV0459	C	5.2.19	Letdown Isolation Valve
15BGK10AD	1335	BGLCV0459	C	5.2.19	Letdown Isolation Valve
15BGK10BA	1335	BGLCV0460	C	5.2.19	Letdown Isolation Valve
15BGK10BD	1335	BGLCV0460	C	5.2.19	Letdown Isolation Valve
15BGK35AB	1335	BGHV8149A	C	5.2.19	Letdown Orifice Isolation Valve
15BGK35AD	1335	BGHV8149A	C	5.2.19	Letdown Orifice Isolation Valve
15BGK35BB	1335	BGHV8149B	C	5.2.19	Letdown Orifice Isolation Valve
15BGK35BD	1335	BGHV8149B	C	5.2.19	Letdown Orifice Isolation Valve

Table A-11-3
PFSSD Cables Located in Fire Area A-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15BGK35CB	1335	BGHV8149C	C	5.2.19	Letdown Orifice Isolation Valve
15BGK35CD	1335	BGHV8149C	C	5.2.19	Letdown Orifice Isolation Valve
15BMK06AC	1335	BMHV0001	C	5.2.20	SG A to Blowdown Flash Tank Isolation Valve
15BMK06BC	1335	BMHV0002	C	5.2.20	SG B to Blowdown Flash Tank Isolation Valve
15BMK06CC	1335	BMHV0003	C	5.2.20	SG C to Blowdown Flash Tank Isolation Valve
15BMK06DC	1335	BMHV0004	C	5.2.20	SG D to Blowdown Flash Tank Isolation Valve
15EMK05EA	1335	EMHV8882	C	5.2.15	Boron Injection Downstream Testline Iso

5.2.1 Steam Generator Level Indication

The decay heat removal function for PFSSD requires the use of two RCS loops and two Steam Generators. Steam generator (SG) level indication is required to support this function. Therefore, level transmitters/indicators associated with the operable steam generators are required to be available and unaffected by the fire.

A fire in area A-11 could affect the Train A MDAFP, which is aligned to supply steam generators B and C. The TDAFP is available to supply auxiliary feedwater to all four Steam Generators and the Train B MDAFP is available to supply auxiliary feedwater to Steam Generators A and D.

Each steam generator is provided with five (5) level transmitters; one (1) wide range and four (4) narrow range. As long as one of the five level transmitters is available, steam generator level indication is satisfied for the associated steam generator. Table A-11-3 identifies the level transmitters that could be affected by a fire in area A-11. Based on Table A-11-3, only one narrow range level transmitter on each steam generator and the wide range transmitter on steam generator A is potentially affected by a fire in area A-11. Therefore, at least one level transmitter on each steam generator is available if a fire occurs in area A-11.

Based on the above discussion, steam generator A, B, C and D level indication is assured if a fire occurs in area A-11.

References: E-15000, XX-E-013, E-1F9203, E-13AE08, E-13AE12, M-12AE02

5.2.2 Auxiliary Feedwater

The PFSSD design requires auxiliary feedwater (AFW) flow to at least two steam generators. Cables associated with Train A MDAFP to Steam Generators (SGs) B and C control valves ALHV0009 and ALHV0011 are run in area A-11. Damage to these cables due to a fire could cause the valves to close, thereby preventing auxiliary feedwater flow from the Train A MDAFP to SGs B and C.

Power and control cables associated with Train A AFW pump room cooler DSGF02A are run in area A-11. Damage to these cables could prevent operation of the room cooler. Cables associated with redundant Train B AFW pump room cooler DSGF02B are unaffected by the fire.

Redundant capability exists and is unaffected by a fire in area A-11. The TDAFP is available to supply auxiliary feedwater to SGs A, B, C and D via valves ALHV0008, ALHV0010, ALHV0012 and ALHV0006, respectively. In addition, the Train B MDAFP is available to supply auxiliary feedwater to SGs A and D via valves ALHV0007 and ALHV0005, respectively. The Train B AFW pump room cooler is available to ensure a proper room environment during operation of the pump.

Based on the above discussion, auxiliary feedwater flow to at least two steam generators is available if a fire occurs in area A-11. Therefore, the auxiliary feedwater function is satisfied.

References: E-15000, XX-E-013, E-13AL09, E-13GF01, E-1F9201, E-1F9202, E-1F9203, E-1F9204, E-1F9444, M-12AL01

5.2.3 Pressurizer Power Operated Relief Valves and Associated Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed. Cables and components associated with PORV BBPCV0455A and associated block valve BBHV8000A are run through area A-11. Cables and components associated with PORV BBPCV0456A and associated block valve BBHV8000B are not located in area A-11.

The pressurizer PORVs are not considered high/low pressure interfaces. The valves are supplied power by an ungrounded 125 VDC system. Therefore, based on GL 86-10, consideration of multiple proper polarity hot shorts is not required. A single proper polarity hot short still needs to be considered.

Cables 11BBK40AG and 11BBK40AJ associated with PORV BBPCV0455A are run in this area. Based on a review of drawing E-13BB40, it would take two concurrent proper polarity hot shorts to cause the PORV to spuriously open. Therefore, a fire in area A-11 is not postulated to open PORV BBPCV0455A due to damage to the control cables associated with the PORV.

An instrument cable (11BBI16KB) associated with pressurizer pressure transmitter BBPT0455 is run in fire area A-11. Damage to this cable could send a spurious high-pressure signal to the pressurizer master controller. However, as discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure channel will not cause the spurious operation of the pressurizer PORVs. Pressurizer level and RCS pressure indication are available to diagnose a failed open PORV using BBLI0460A and BBPI0406, respectively. In addition, pressurizer pressure indication is available using BBPI0456, BBPI0457 and BBPI0458.

Based on the above discussion, pressurizer PORV BBPCV0455A will not spuriously open due to a spurious high pressurizer pressure signal or due to damage to control cables in the area.

References: E-15000, XX-E-013, E-13BB16, E-13BB39, E-13BB40, E-1F9301, M-12BB02, M-744-00028, OFN KC-016, CR 13079, DCP 12944, DCP 13324.

5.2.4 RCS Hot and Cold Leg Temperature Elements

PFSSD requires RCS hot and cold leg temperature indication on at least one loop to verify flow through the steam generators. The temperature elements used for this purpose are listed in Table A-11-4.

As identified in Table A-11-3, cables associated with RCS temperature elements BBTE0413A, BBTE0423A, BBTE0433B and BBTE0443B are run in area A-11. These cables are run in the same raceway through fire area A-11. A fire could damage these cables and cause temperature indication on these four temperature elements to be unavailable. Consequently, temperature indication on at least one leg on each loop could be lost, which is not in accordance with the PFSSD methodology at Wolf Creek.

Table A-11-4 RCS Hot and Cold Leg Temperature Elements Used for PFSSD	
COMPONENT	**FUNCTION**
BBTE0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	RCS Cold Leg Temperature Element (WR) Loop 4

Procedure EMG ES-04, Attachment B Section B1 provides alternate indication in the control room that may be used to verify natural circulation flow. One of these methods verifies that steam generator pressure is stable or decreasing. S/G “A” and S/G “D” pressure instruments ABPT0516 and ABPT0546 are unaffected by a fire in A-11 and can be used per EMG ES-04 to verify heat removal in loops 1 and 4.

The configuration is acceptable because, in the event of a fire in fire area A-11, cooldown can be performed using RCS loops 1 and 4. RCS wide range hot and cold leg temperature elements (BBTE0413B and BBTE0443A) as well as ABPT0516 and ABPT0546 will provide indication of flow through the steam generators.

References: E-15000, XX-E-013, E-13BB15, E-1F9201, M-12AB01, M-12BB01, EMG ES-04

5.2.5 Safety Injection and Containment Spray

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. A spurious containment spray actuation signal (CSAS) could cause the containment spray pumps to operate, depleting inventory in the RWST. These conditions are not desirable for PFSSD at Wolf Creek.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Containment spray (CS) is initiated automatically by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937.

Only cables associated with BBPT0455 and GNPT0937 are run in area A-11. Cables associated with the remaining transmitters are unaffected by a fire in area A-11. Therefore,

none of the safety injection or containment spray actuation signal initiators can be satisfied by spurious signals and a spurious start of either the safety injection or containment spray pumps is not credible.

Power and control cables associated with Train A containment spray isolation valve ENHV0006 are run in fire area A-11. Damage to these cables could cause the valve to spuriously open. However, as stated in the previous paragraph, a spurious CSAS is not credible if a fire occurs in this area. In addition, control cables associated with the Train A containment spray pump are located outside fire area A-11. Therefore, the Train A containment spray pump will not spuriously start if a fire occurs in area A-11.

References: E-15000, XX-E-013, E-13BB16, E-13EN03, E-13GN05, E-1F9431, E-1F9432, E-1F9433, M-12BB02, M-12EN01, M-12GN01

5.2.6 Pressurizer Level Transmitters

PFSSD requires available pressurizer level indication. Pressurizer level indication is provided by level transmitters BBLT0459 and BBLT0460. One cable associated with BBLT0459 runs in area A-11. Consequently, BBLT0459 may not be available if a fire occurs in this area.

Cables associated with pressurizer level transmitter BBLT0460 do not run through fire area A-11. Therefore, pressurizer level indication is available if a fire occurs in area A-11 using BBLT0460/BBLI0460A.

References: E-15000, XX-E-013, E-1F9301, E-13BB16, M-12BB02

5.2.7 Reactor Head Vent Valves

PFSSD requires that one of the two reactor vessel head vent valves on each flow path (2 flow paths total) be closed to prevent uncontrolled depressurization of the RCS. Either BBHV8001A or BBHV8002A and either BBHV8001B or BBHV8002B needs to be closed.

Only one cable associated with head vent valve BBHV8001A is run through A-11. An external (+) 125VDC hot short across conductor 2 in this cable is the only failure that will spuriously open this valve. Since this cable is run in tray with other cables carrying the proper voltage and polarity, this failure is considered credible.

Cables for the remaining three head vent valves are not run through area A-11 and are unaffected by a fire. Therefore, the spurious opening of BBHV8001A is mitigated by maintaining valve BBHV8002A closed. The second flow path is isolated using either head vent valve BBHV8001B or BBHV8002B.

Based on this discussion, both head vent valve flow paths can be isolated if a fire occurs in area A-11.

References: E-15000, XX-E-013, E-1F9301, E-13BB30, M-12BB04

5.2.8 Charging Flow to Regenerative Heat Exchanger Isolation Valves

PFSSD requires charging flow be directed to the RCP seals. To ensure adequate flow to RCP seals, flow diversion to the regenerative heat exchanger needs to be prevented. Valves BGHV8105 and BGHV8106 are included in the PFSSD design to accomplish this task. Manual valve BG8402B is also included to provide an alternate means of closing this flow path if either BGHV8105 or BGHV8106 are unavailable and is also used during alternate safe shutdown per OFN RP-017.

Cables associated with BGHV8106 are run in area A-11 and could be damaged by a fire, preventing valve BGHV8106 from being closed from the control room. Cables associated with

BGHV8105 are not located in area A-11 and are unaffected by a fire in this area. Therefore, valve BGHV8105 can be closed from the control room using BGHIS8105.

References: E-15000, XX-E-013, E-1F9102, E-1F9302, E-13BG11A, M-12BG03

5.2.9 Excess Letdown

PFSSD requires the excess letdown path be isolated to prevent uncontrolled depressurization of the RCS. To accomplish this, either normally closed valve BGHV8153A or BGHV8154A must be maintained closed and either normally closed valve BGHV8153B or BGHV8154B must be maintained closed.

Only one cable associated with BGHV8154A runs through area A-11. Cables associated with the remaining valves are unaffected by a fire in area A-11. Therefore, at least one valve on each flowpath will remain closed or can be controlled from the control room.

References: E-15000, XX-E-013, E-1F9301, E-13BG48, M-12BG01

5.2.10 Containment Coolers

PFSSD requires containment cooling to maintain the containment environment within EQ limits. Cables associated with Train A containment coolers are run in area A-11. These cables are listed in Table A-11-3.

Damage to these cables could prevent operation of the Train A containment coolers if a fire occurs in area A-11. However, circuits for the Train B containment coolers are run in a separate fire area and are unaffected by a fire in area A-11.

Train B ESW is available if a fire occurs in area A-11. Therefore, the Train B containment coolers will have the necessary service water flow to ensure proper operation.

Based on the above discussion, the Train B containment coolers will be used to provide containment cooling in the event of a fire in area A-11.

References: E-15000, XX-E-013, E-13EF07, E-13EF08, E-13EF09, E-13GN02, E-13GN02A, E-1F9403, E-1F9441, M-12EF02, M-12GN01

5.2.11 CCW to/from RCP Thermal Barriers

The Wolf Creek plant design provides two redundant methods of cooling the RCP seals, thermal barrier cooling using CCW and seal injection using the CCP. The PFSSD methodology at Wolf Creek requires tripping the RCPs and performing a natural circulation cooldown upon loss of both thermal barrier cooling (TBC) and seal injection. If only one method is lost, continued operation of the RCP is allowed by present established procedures until the other method is re-established.

Valves BBHV0013, BBHV0014, BBHV0015, BBHV0016, EGHV0058, EGHV0061, EGHV0126 and EGHV0132 provide isolation capability for CCW flow to/from the RCP thermal barriers. Cables associated with these components are located in area A-11. If the valves fail to the open position, CCW would continue to flow to the RCP components, including the thermal barrier. This continued flow of water will not adversely impact PFSSD. If the valves fail to the closed position, CCW flow to the thermal barrier could be lost. This is acceptable since RCP seal injection is available.

Flow transmitters BBFT0017, BBFT0018, BBFT0019 and BBFT0020 are associated with valves BBHV0013, BBHV0014, BBHV0015 and BBHV0016, respectively. The flow transmitters monitor flow in the CCW piping and shut the valves on high CCW flow. Cables associated with these flow transmitters are run in this area. Damage to these cables could

cause a spurious high CCW flow signal and close the valves. Damage to the valve cables could prevent re-opening the valves.

Loss of thermal barrier cooling would be indicated in the control room as a reduction in flow on flow indicators EGFI0128 and EGFI0129. Therefore, operators can diagnose a loss of thermal barrier cooling.

Based on the above discussion, a fire in area A-11 could affect CCW flow to/from the RCP thermal barriers. However, RCP seal injection is unaffected.

References: E-15000, XX-E-013, E-13BB03, E-13BB28, E-13EG09, E-13EG09A, E-13EG10, E-13EG17A, E-13EG18, E-1F9303, M-12BB03, M-12EG03

5.2.12 Reactor Coolant System (RCS) to Residual Heat Removal (RHR) Isolation Valves

Loss of inventory from the RCS to the RHR system is prevented by maintaining either valves BBPV8702A or EJHV8701A and either valves BBPV8702B or EJHV8701B closed. All four valves are normally closed with their breakers administratively locked in the off position.

Control cables associated with valves EJHV8701A and EJHV8701B are run in area A-11. Cables associated with BBPV8702A and BBPV8702B are not run in area A-11. Consequently, the RCS to RHR flowpath on both trains will remain isolated if a fire occurs in area A-11.

When aligning RHR for cold shutdown, at least one flowpath to one RHR pump is required. Valves BBPV8702A and BBPV8702B can be opened from the control room when power is restored at the MCC. As discussed in Section 5.2.13, valve EJHV8811A could spuriously open. Therefore, Train B RHR should be used for decay heat removal to ensure the RCS does not drain to the containment sump. It may be necessary to manually open EJHV8701B to provide a suction source to the Train B RHR pump.

References: E-15000, XX-E-013, CKL BB-110, CKL EJ-120, E-13EJ05A, E-13EJ05B, E-1F9205, E-1F9301, M-12BB01, M-12EJ01

5.2.13 Containment Sump Isolation Valves

To prevent draindown of the RWST into the containment sump, PFSSD requires that either valves BNHV8812A or EJHV8811A and either valves BNHV8812B or EJHV8811B be closed during hot standby. For cold shutdown, the operating train containment sump valve (EJHV8811A or EJHV8811B) must be maintained closed to prevent flow diversion from the RCS to the containment sump. Valves BNHV8812A and BNHV8812B are normally open and valves EJHV8811A and EJHV8811B are normally closed.

Cables associated with valve EJHV8811A run through fire area A-11. In order for valve EJHV8811A to spuriously open, it will take two simultaneous intra-cable hot shorts to occur. The hot shorts need to involve conductors 62 and 52 in 2-conductor cable 11EJG06AU and conductors 2 and 42 in 7-conductor cable 11EJG06AC. Although extremely unlikely, if this occurs, valve BNHV8812A will automatically close, as designed, to prevent draindown of the RWST into the containment sump. However, if EJHV8811A partially opens, then BNHV8812A will not automatically close. In this case, operators will recognize a decreasing RWST inventory and can close BNHV8812A from the control room using BNHIS8812A. Cables associated with valve BNHV8812A do not run in area A-11.

During cold shutdown, Train B RHR is available since EJHV8811B will remain closed and the RCS will not drain to the sump.

Based on the above discussion, redundant capability exists to ensure the RWST and RCS do not drain to the containment sump.

References: E-15000, XX-E-013, E-13BN03, E-13BN03A, E-13EJ06A, E-13EJ06B, E-1F9102, E-1F9205, M-12BN01, M-12EJ01, M-10BN

5.2.14 RHR to Accumulator Injection Loop Isolation Valves

The RHR pump discharge to RCS cold leg isolation valve (EJHV8809A or EJHV8809B) needs to be open on the operating train. Damage to cables 11EJG09CA, 11EJG09CB, 11EJG09CC and 11EJG09CD would likely result in valve EJHV8809A remaining in its as-is normally open position, which is the preferred PFSSD position. However, two proper intra-cable hot shorts in cable 11EJG09CD or one intra-cable hot short in cable 11EJG09CD combined with a short to ground on conductor 31 would spuriously close valve EJHV8809A.

Cables for valve EJHV8809B are run in a separate fire area and are unaffected by a fire in area A-11. Therefore, the Train B RHR pump discharge to RCS cold leg flow path is available for a fire in area A-11.

Based on the above discussion, the Train A RHR system could be affected but the Train B RHR system is available in the event of a fire in area A-8.

References: E-15000, XX-E-013, E-13EJ09A, E-1F9205, M-12EJ01

5.2.15 Boron Injection Tank Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

A fire in area A-11 will not result in a loss of seal injection. However, based on the discussion in 5.2.19, a fire in area A-11 has the possibility to cause a momentary loss of inventory through the letdown flow path until the letdown isolation valves are failed closed. Therefore, charging through the BIT flow path may be required for hot standby. In addition, as discussed above, the BIT flowpath is required for transition to cold shutdown.

Power and control cables associated with BIT outlet valve EMHV8801A and BIT inlet valve EMHV8803A run through area A-11. Damage to these cables could prevent operation of the valves from the control room. Cables associated with redundant valves EMHV8801B and EMHV8803B do not run in area A-11 and would be available to provide a flowpath from Train B charging pump to the RCS.

When charging through the BIT, the SIS test line is required to be isolated to prevent inventory loss. Valves EMHV8843, EMHV8882, EMHV8964 and EMHV8871 are used to isolate this flowpath. Either valves EMHV8964 or EMHV8871 are required to be closed or both valves EMHV8843 and EMHV8882 are required to be closed to isolate the SI test line.

Control cables associated with valves EMHV8882 and EMHV8964 are run in area A-11. Damage to these cables could cause the valves to spuriously open. Cables associated with redundant valve EMHV8871 are run in a different fire area and are unaffected by a fire in area A-11. Therefore, the SI test line can be isolated if a fire occurs in area A-11.

Based on the above discussion, a fire in area A-11 will not adversely impact the ability to isolate the SIS test line and charge through the BIT.

References: E-15000, XX-E-013, E-13EM02, E-13EM02C, E-13EM05A, E-13EM12, E-1F9302, M-12EM01, M-12EM02

5.2.16 Safety Injection Accumulator Isolation Valves

PFSSD requires isolation of the SI accumulators prior to reducing RCS pressure below the injection pressure to avoid unnecessary accumulator discharge. This is accomplished by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. These valves are normally open with the MCC breaker administratively locked in the open position. Cables for valves EPHV8808A and EPHV8808C are run in area A-11.

Since the breakers for these valves are normally open, damage to these cables will not cause the valves to spuriously change position. However, damage to the cables will prevent closing the associated valve from the control room after power is restored.

The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig. If necessary, a containment entry can be made to manually close the valves.

References: E-15000, XX-E-013, M-12EP01, E-13EP02A, E-1F9201, CKL EP-120

5.2.17 480 VAC Power Distribution

A fire in area A-11 could damage cables associated with the Train A 480 VAC power distribution system. Cables 11NGG01AD and 11NGG01AE supply power from NG0107 to NG01BAF1. Damage to these cables could result in loss of power to Train A PFSSD components fed from NG01B. Drawing E-1F9424A identifies the Train A PFSSD loads associated with NG01B.

Cable 11NGG01AJ is the power cable for containment cooler SGN01A. Cable 11NGG01BF is the power cable for containment cooler SGN01C. As stated in Section 5.2.10, loss of containment coolers SGN01A and SGN01C will not prevent PFSSD due to the availability of the Train B containment coolers.

The loss of NG01B will not prevent PFSSD. Loss of power to the associated loads is acceptable due to the availability of Train B 480 VAC power from NG02 and NG04. None of the PFSSD equipment associated with NG01B is required if a fire occurs in area A-11.

References: E-15000, XX-E-013, E-13NG01A, E-1F9424A, E-1F9441

5.2.18 Main Control Board RL017/RL018 120 VAC Non Class 1E Power

120 VAC non-class 1E distribution switchboards PN07 and PN08 supply power to separation groups 5 and 6, 120 VAC loads on RL017/RL018. Each distribution switchboard relies on two redundant sources of power. PN07 is powered from either transformer XPN07A or XPN07D. PN08 is powered from either transformer XPN08A or XPN08D.

Cable 11PNG01AE is a power cable that runs from NG001BEF4 to NG001ABF1, through area A-11, and feeds transformer XPN07A. Damage to this cable could cause a loss of power to XPN07A, which will result in a loss of power to one of the two redundant feeds to PN07. Transformer XPN07D is unaffected by the fire and will remain available to supply power to PN07.

References: E-15000, XX-E-013, E-13PN01, E-13PN01A, E-13RL01, E-13RL04, E-1F9421

5.2.19 Letdown Isolation Valves

Valves BGLCV0459 and BGLCV0460 are isolation valves installed in series on the inlet side of the regenerative heat exchanger. PFSSD requires that either of these valves be closed.

Cables 15BGK10AA and 15BGK10AD are power/control cables for the BGLCV0459 solenoid valve (BGHY0459). Air supplied by an open (energized) solenoid valve will open valve BGLCV0459. A closed (de-energized) solenoid valve will cause loss of air pressure and closure of valve BGLCV0459.

Cables 15BGK10BA and 15BGK10BD are power/control cables for the BGLCV0460 solenoid valve (BGHY0460). Air supplied by an open (energized) solenoid valve will open valve BGLCV0460. A closed (de-energized) solenoid valve will cause loss of air pressure and closure of valve BGLCV0460.

Either BGLCV0459 or BGLCV0460 must be closed or letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C must be closed. The cables for BGLCV0459 or BGLCV0460 are routed in a common enclosure in cable trays. A hot short on the cables could cause the valves to open. An intra-cable hot short in cables 15BGK10AA and 15BGK10BA prevents closing BGLCV0459 and BGLCV0460 from the control room. Other cables routed in the cable trays have the proper voltage for inter-cable hot shorts which can bypass MCB hand switches for BGLCV0459 and BGLCV0460. BGLCV0459 and BGLCV0460 constitute a high/low pressure interface. Therefore, multiple simultaneous hot shorts must be considered.

Letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C are listed as PFSSD components because of the interlock between these valves and BGLCV0459 and BGLCV0460. The interlock prevents closure of the letdown valves when any one or more orifice isolation valves are open. Cables associated with all three letdown orifice isolation valves are located in this fire area. Damage to these cables could prevent closure of the valves from the control room. Therefore, a fire in area A-11 will prevent closure of all three letdown orifice isolation valves (BGHV8149A, BGHV8149B, and BGHV8149C) as well as the two letdown isolation valves (BGLCV0459 and BGLCV0460).

BGHV8152 is located in the low-pressure piping rated for only 600 psi pressure down stream of BGLCV0459 and BGLCV0460. Isolating BGHV8152 with the reactor pressure above 600 psi will cause relief valve BGV8117 to open to protect the pipe and discharge the water to the PRT. A maximum of 195 gpm can be passed through the three orifice isolation valves if they are all open. The centrifugal charging pump capacity is 150-gpm. Therefore approximately 45-gpm could be lost while BGLCV0459 and BGLCV0460 remain open.

Valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B, and BGHV8149C are air operated and fail in the closed position. The valves are located in containment. Instrument air to containment is controlled by valve KAFV0029, which is unaffected by a fire in area A-11. Hand switch KAHIS0029 can be used to close the valve from the control room and isolate instrument air to containment. Pressurizer level indication is available using BBLI0460A.

Based on the above discussion, letdown valves BGLCV0459 and BGLCV0460 and letdown orifice valves BGHV8149A, BGHV8149B, and BGHV8149C can be closed from the control room if a fire occurs in area A-11.

References: E-15000, XX-E-013, E-13BG10, E-13BG35, E-13KA02, E-1F9301, M-12BG01, M-12KA01

5.2.20 Steam Generator Blowdown to Blowdown Flash Tank Valves

Blowdown valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 are required to be closed to prevent reactivity addition due to uncontrolled cooldown. The valves are air operated, and each valve is controlled by three solenoid valves. All three solenoid valves are required to be energized to open the valve. If any one solenoid is de-energized, the associated valve will close or remain closed. Only two of the three solenoids for each valve are considered in the PFSSD analysis, so the third solenoid is assumed energized throughout the event.

Cables associated with one of the three solenoid valves for each main valve are run in area A-11. These cables are associated with the BM157 panel hand switches located in the Radwaste Building control room. Damage to these cables could result in the associated solenoid valves becoming energized.

Cables associated with the main control room hand switches for each main valve are not located in area A-11. Therefore, the solenoid valve associated with the main control room hand switches remains available to ensure the main valves are closed.

Based on the above discussion, isolation of the Steam Generator Blowdown valves is achievable if a fire occurs in area A-11.

References: E-15000, XX-E-013, E-13BM06A, E-13BM06D, E-1F9101, M-12BM01

5.2.21 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling or spuriously open pressurizer spray is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs. Calculation WCNOC-CP-002 shows that if pressurizer spray spuriously actuates, the spray flow needs to be stopped within 50 minutes.

Control cables associated with reactor coolant pumps A and B are run in fire area A-11. Damage to these cables in the event of a fire could prevent operators from stopping the A and B RCPs from the control room. However, a fire in A-11 will not cause a loss of all seal cooling since RCP seal injection remains available. As discussed in Section 5.2.22, if pressurizer spray spuriously operates, operators can stop the spray by isolating air to the valve from the control room. Therefore, tripping the RCPs is not required to mitigate spurious pressurizer spray.

Based on the above discussion, the inability to trip RCPs A and B from the control room will have no adverse impact on PFSSD. If pressurizer spray spuriously actuates, the valves can be closed by isolating air to the valves from the control room. In addition, seal injection is unaffected by a fire in area A-11. Therefore, the RCPs do not have to be tripped in the event of a fire in area A-11.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1, WCNOC-CP-002, CR 25002

5.2.22 Normal Pressurizer Spray

The normal pressurizer spray valves are included in the PFSSD design because spurious operation of pressurizer sprays can cause a decrease in pressure which can lead to boiling in the core. The pressurizer spray valves are part of the pressurizer pressure control system.

The pressurizer normal spray valves (BBPCV0455B and BBPCV0455C) operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

Cable 11BBI16KB associated with BBPT0455 is run in this area. Damage to this cable could cause a spurious high-pressure signal. As discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure input channel will not cause the spurious operation of the pressurizer spray valves due to the Ovation 4-channel validation logic, which uses the 2nd highest signal as the validated signal and has built-in logic to detect and ignore a failed input.

Cable 15BBI19AA associated with pressurizer spray valve BBPCV0455B, and cable 15BBI19BA associated with pressurizer spray valve BBPCV0455C are run in this area. Damage to these cables could cause the spurious opening of the spray valves.

The pressurizer spray valves are electro/pneumatic operated, and loss of air pressure will close the valves. The air supply comes from the compressed air system. Closing valve KAFV0029 using KAHIS0029 on RL024 will isolate compressed air to containment which will cause the pressurizer spray valves to close or prevent them from opening. Based on WCNOC-CP-002, spray flow needs to be stopped within 50 minutes. Since this is a control room action, this can be completed well within 50 minutes.

Based on the above discussion, the pressurizer spray valves could spuriously open if a fire occurs in this area. Pressurizer spray can be stopped by closing valve KAFV0029 from the main control room. Pressurizer pressure indication is available using BBPI0456, BBPI0457 and BBPI0458.

References: E-15000, XX-E-013, E-13BB16, E-13BB19, E-13KA02, E-1F9304, M-744-00028, M-761A-00063, WCNOC-CP-002, CR 25002, DCP 13324

FIRE AREA A-12

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-12 is located on the 2000 elevation of the Auxiliary Building and includes the room listed in Table A-12-1.

Table A-12-1
Rooms Located in Fire Area A-12

ROOM #	DESCRIPTION
1336	South Electrical Chase

Fire area A-12 is protected with an automatic fire suppression system. In addition, automatic fire detection is installed throughout. The area is bounded on all sides by minimum 3-hour fire rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-12-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-12-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-12

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
BB	Reactor Coolant System	R, M, H, P, S	All PFSSD functions associated with the reactor coolant system are satisfied. Cables associated with all four RCP seal injection valves could be affected, however seal injection is unaffected because the cable damage will not cause the valves to close. RCS pressure indication is available using BBPI0405. Reactor coolant pumps C and D may not stop using the control room hand switch. RCP seal injection and thermal barrier cooling remain available. Therefore, the inability to stop the RCPs will have no adverse impact on PFSSD.
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. RCP seal flow indication is available using BGFI0215A. RCP seal flow indicator BGFI0215B may be affected.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
EF	Essential Service Water System	H, S	All PFSSD functions associated with the Essential Service Water (ESW) system are satisfied. Train B ESW to containment cooler valves EFHV0032 and EFHV0050 may not be operable from the control room. If the valves are open at the time of the fire, they will not spuriously close. Train A ESW is available to supply cooling water to Containment Air Coolers SGN01A and SGN01C, as well as all other required PFSSD loads.

Table A-12-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-12

System	System Name	PFSSD Function*	Comments
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
EJ	Residual Heat Removal System	M, H, P	All PFSSD functions associated with the Residual Heat Removal (RHR) system are satisfied. Train B RHR may not be available due to the spurious closure of EJHV8809B. Train A RHR is unaffected. In the unlikely event valve EJHV8840 spuriously opens and does not respond to a close signal, perform a cold shutdown repair to close the valve or isolate valve EJHV8716A to prevent flow from Train A RHR through this flow path.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
EN	Containment Spray	R, M	All PFSSD functions associated with the Containmant Spray system are satisfied. Cables for valve ENHV0012 could be damaged but will not cause the valve to open.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.

Table A-12-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-12

System	System Name	PFSSD Function*	Comments
GN	Containment Coolers	S	The PFSSD Support function associated with the Containment Coolers is satisfied. Train B containment coolers SGN01B and SGN01D may not be available due to possible loss of ESW supply to the coolers. Train A containment coolers SGN01A and SGN01C are unaffected.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
PG	480V Load Centers and MCCs	S	Breaker PA0206 could trip. This will not affect PFSSD since redundant capability exists.

Table A-12-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-12

System	System Name	PFSSD Function*	Comments
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-12.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-12. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR

If valve EJHV8840 spuriously opens, perform a cold shutdown repair or manually close valve EJHV8716A to isolate RHR Train A flow to the hot leg.

4.0 CONCLUSION

Post-Fire Safe Shutdown capability is assured if a severe fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-12.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-12

There are no PFSSD components located in area A-12. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table A-12-3 lists all the PFSSD cables (S. in E-15000) located in fire area A-12. The applicable evaluation section is also listed in Table A-12-3.

Table A-12-3
PFSSD Cables Located in Fire Area A-12

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BBG04AA	1336	BBHV8351A	P	5.2.1	RCP A Seal Water Injection Valve
14BBG04AB	1336	BBHV8351A	C	5.2.1	RCP A Seal Water Injection Valve
14BBG04BA	1336	BBHV8351B	P	5.2.1	RCP B Seal Water Injection Valve
14BBG04BB	1336	BBHV8351B	C	5.2.1	RCP B Seal Water Injection Valve
14BBG04CA	1336	BBHV8351C	P	5.2.1	RCP C Seal Water Injection Valve
14BBG04CB	1336	BBHV8351C	C	5.2.1	RCP C Seal Water Injection Valve
14BBG04DA	1336	BBHV8351D	P	5.2.1	RCP D Seal Water Injection Valve
14BBG04DB	1336	BBHV8351D	C	5.2.1	RCP D Seal Water Injection Valve
14BBI16BA	1336	BBPT0406	I	5.2.2	RCS Pressure Wide Range Hot Leg
14BGI51BA	1336	BGFT0215B	I	5.2.1	RCP Seal Total Flow Transmitter
14EFG07BA	1336	EFHV0032	P	5.2.3	ESW B To Ctmt Air Coolers Iso Valve
14EFG07BB	1336	EFHV0032	C	5.2.3	ESW B To Ctmt Air Coolers Iso Valve
14EFG08BA	1336	EFHV0050	P	5.2.3	ESW B From Ctmt Air Coolers Iso Valve
14EFG08BB	1336	EFHV0050	C	5.2.3	ESW B From Ctmt Air Coolers Iso Valve
14EJG09AA	1336	EJHV8840	P	5.2.4	RHR Isolation To RCS Hot Leg Loops 2 & 3
14EJG09AB	1336	EJHV8840	C	5.2.4	RHR Isolation To RCS Hot Leg Loops 2 & 3
14EJG09BA	1336	EJHV8809B	P	5.2.4	RHR Iso Valve To Cold Leg RCS Loops 3 & 4
14EJG09BB	1336	EJHV8809B	C	5.2.4	RHR Iso Valve To Cold Leg RCS Loops 3 & 4
14ENG03BA	1336	ENHV0012	P	5.2.5	Containment Spray Isolation Valve
14ENG03BB	1336	ENHV0012	C	5.2.5	Containment Spray Isolation Valve
16BBA01CE	1336	DPBB01C	C	5.2.6	Reactor Coolant Pump C Motor
16BBA01DE	1336	DPBB01D	C	5.2.6	Reactor Coolant Pump D Motor
16PGA10CA	1336	PA0206	C	5.2.7	Load Centers PG12, PG16 and PG26 Fdr Bkr

5.2.1 Reactor Coolant Pump (RCP) Seal Injection

PFSSD requires RCP seal injection to provide a boron injection path, provide makeup to the RCS to maintain hot standby inventory and prevent damage to the RCP seals. The Component Cooling Water (CCW) system is an alternative means of cooling the RCP seals.

Cables associated with all four seal injection valves (BBHV8351A, BBHV8351B, BBHV8351C and BBHV8351D) are run in area A-12, and are listed in Table A-12-3. The valves are normally open and de-energized and are required to remain open during a fire. The valves are not high/low pressure interface valves so three-phase hot shorts do not have to be considered and, consequently, damage to the power cables will not cause the valves to close. Damage to the control cable for each valve located in this area will not cause the valves to spuriously close since a hot short or open circuit in these cables will not bypass the control room hand switch. Furthermore, the valves are de-energized so cable damage could not cause the valves to close.

Cable 14BGI51BA is associated with RCP seal total flow indicator BGFT0215B. Damage to this cable could prevent operation of the flow transmitter and could prevent operators from determining total RCP seal injection flow using flow indicator BGFI0215B. Flow indicator BGFI0215A is unaffected by a fire in area A-12 and can be used by operators to determine if seal injection flow is functioning.

Based on the above discussion, there is reasonable assurance that the seal injection valves will remain open in the event of a fire in area A-12. Therefore, RCP seal injection is available to provide hot standby inventory control and seal cooling. Loss of the operating charging pump would be indicated by loss of flow to the RCP seals using flow indicator BGFI0215A.

References: E-15000, XX-E-013, E-13BB04, E-13BG51, E-1F9303

5.2.2 Reactor Coolant System (RCS) Pressure Indication

PFSSD requires RCS pressure indication to be available. RCS pressure indication is provided in the control room using BBPI0405 or BBPI0406.

Cable 14BBI16BA, associated with BBPT0406 runs through fire area A-12. Damage to this cable could prevent operation of pressure indicator BBPI0406.

Cables for BBPT0405 are run in a separate fire area and are unaffected by a fire in area A-12. Therefore, RCS pressure indication will be available using BBPI0405 if a fire occurs in area A-12.

References: E-15000, XX-E-013, E-13BB15, E-13BB16, E-1F9201, M-12BB04

5.2.3 Containment Coolers

PFSSD requires containment cooling to maintain credited equipment within operational limits. Power and control cables associated with normally open valves EFHV0032 and EFHV0050 (ESW supply to the Train B containment coolers) are run in area A-12. Damage to these cables could prevent operation of the valves from the control room but will not cause the valves to spuriously close. If the valves are closed at the time of the fire, then Train B containment cooling may not be available.

Cables associated with the ESW supply to the Train A containment coolers are run in a separate fire area and are unaffected by a fire in area A-12. Therefore, the Train A containment coolers are available to provide containment cooling in the event of a fire in area A-12.

References: E-15000, XX-E-013, E-13EF07, E-13EF08, M-12EF02, E-1F9403, E-1F9441

5.2.4 RHR To RCS Hot and Cold Legs

During cold shutdown mode, PFSSD requires one RHR pump operating and discharging into the cold legs of either Loops 1 and 2 (Train A RHR) or 3 and 4 (Train B RHR). In addition, hot leg injection needs to be isolated.

Valve EJHV8840 is required to be closed to prevent injection through the hot leg of loops 2 and 3. Cables associated with this valve run through area A-12. In order for the valve to spuriously open, it would take two simultaneous hot shorts within the same multi-conductor cable. This is unlikely to occur since it would take the proper source conductor shorting to a specific target conductor without shorting to a different conductor or shorting to ground to cause the valve to open. In the unlikely event the valve spuriously opens, a cold shutdown repair can be performed, or valve EJHV8716A can be locally manually closed, to prevent flow from Train A RHR through this flow path. If Train B RHR is being used, then valve EJHV8716B can be closed to isolate this flow path.

Either EJHV8809A or EJHV8809B needs to be open when operating RHR pumps A or B, respectively. Cables associated with EJHV8809B run through area A-12 and could be damaged such that the valve spuriously closes. Cables associated with valve EJHV8809A are not run in area A-12. Consequently, valve EJHV8809A is unaffected if a fire occurs in area A-12.

Based on the above discussion, a flow path is available to ensure RHR flow to the RCS.

References: E-15000, XX-E-013, E-13EJ09A, E-1F9205, M-12EJ01

5.2.5 Containment Spray Isolation Valve

Power and control cables associated with containment spray isolation valve ENHV0012 are located in this area. Damage to these cables will not cause the valve to spuriously open. Therefore, RWST inventory reduction due to containment spray actuation will not occur.

References: E-15000, XX-E-013, E-13EN03, E-1F9424B, E-1F9433, M-12EN01

5.2.6 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs.

Control cables associated with reactor coolant pumps C and D are run in fire area A-12. Damage to these cables in the event of a fire could prevent operators from stopping the C and D RCPs from the control room. However, a fire in A-12 will not cause a loss of all seal cooling since RCP seal injection and thermal barrier cooling remain available.

Based on the above discussion, the inability to trip the C and D RCPs from the control room will have no adverse impact on PFSSD. The pumps can continue to operate, providing forced flow circulation. If the pumps spuriously stop, natural circulation cooldown can be used.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1

5.2.7 Load Center Feeder Breaker PA0206

Load center feeder breaker PA0206 is credited for PFSSD because it supplies power to credited non-safety related loads. Cable 16PGA10CA is a control cable associated with breaker PA0206. An intra-cable hot short in this cable will trip PA0206. Breaker PA0206 supplies power to the following PFSSD components:

- PG12KAF4 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0032
- PG12KAF5 – Main Steam Supply to Steam Seals Valve ABHV0046
- PG12KEF3 – Auxiliary Steam System Control Valve FBHV0080

PG12KAF4, PG12KAF5 and PG12KEF3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using either hand switch ABHS0079 or ABHS0080. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Based on the above discussion, loss of breaker PA0206 due to a fire in area A-12 will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13PG10, E-1F9424E

FIRE AREA A-13

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-13 is located on the 2000 elevation of the Auxiliary Building and includes the room listed in Table A-13-1.

Table A-13-1
Rooms Located in Fire Area A-13

ROOM #	DESCRIPTION
1325	Aux Feed Water Pump Room B

Fire area A-13 is protected with automatic smoke detection. There is no automatic fire suppression installed. The room is separated from adjacent areas by minimum 3-hour fire rated barriers.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-13-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-13-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-13

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Steam Generator B ARV ABPV0002 may need to be controlled using local controller ABFHC0002. The controller for Steam Generators A and D ARVs may need to placed in manual and closed from the main control room. Steam generator C ARV is unaffected by a fire in this area. Cables for hand switch ABHS0079 may be damaged by the fire. Cables for redundant hand switch ABHS0080 are unaffected. Use ABHS0080 to close the MSIVs and MSIV bypass valves. Both steam supply valves (ABHV0005 and ABHV0006) to the TDAFP may be affected. Steam generators B and C pressure indication is available using ABPI0524A, ABPI0526A, ABPI0534A and ABPI0536A. Pressure indication on steam generators A and D may be lost.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
AE	Main Feedwater	H, P	Cables for hand switch AEHS0081 may be damaged. Cables for redundant hand switch AEHS0080 are unaffected. Use AEHS0080 to close the MFIVs.
AL	Aux. Feedwater System	H, P	The Train B MDAFP and the TDAFP are unavailable. The Train A MDAFP is unaffected. Spurious ESFAS swap over to the ESW system could occur due to damage to circuits for two of the three pressure transmitters. This is acceptable since the ESW system is the safety related source for auxiliary feedwater.
AP	Condensate Storage System	H	The CST is available, however as stated in AL system, a spurious swap over to ESW could occur.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13. RCS pressure indication is available using BBPI0405 and BBPI0406. Pressurizer level indication is available using BBLI0459A and BBLI0460A.
BG	Chemical and Volume Control System	R, M, S	A spurious SI signal will cause CCPs PBG05A and PBG05B to start. PBG05A is credited for PFSSD if a fire occurs in this area. PBG05B can be stopped, if necessary, by placing hand switch BGHIS0002A in pull-to-lock.
BM	Steam Generator Blowdown System	R, M, H	Blowdown through BMHV0002 and BMHV0003 may need to be isolated using BMHIS0002C and BMHIS0003C located on the BM157 panel in the Radwaste Control room. The remaining blowdown valves can be closed from the main control room.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.

Table A-13-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-13

System	System Name	PFSSD Function*	Comments
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
EM	High Pressure Coolant Injection	R, M	A spurious start of the SI pumps due to two out of three low steam line pressures can be terminated by placing the pump control hand switches EMHIS0004 and EMHIS0005 on panel RL017 in pull-to-lock.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
FC	Auxiliary Turbines	R, H, P	The Turbine Driven Auxiliary Feedwater Pump may not be available if a fire occurs in this area. Cables associated with FCHV0312 and FCFV0313 run in this area and could cause the valves to close, isolating steam supply to the TDAFP. A cable associated with steam trap valve FCFV0310 runs in this area and could cause the valve to remain open. This is acceptable since steam flow through a 1-inch line is bounded by the main steam line break analysis.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
GF	AFW Pump Room Coolers	S	The Train B AFW pump room cooler and associated cables are located in this area. The Train A AFW pump room cooler and cables are unaffected.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.

Table A-13-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-13

System	System Name	PFSSD Function*	Comments
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13. Containment pressure indicators GNPI0934, GNPI0935, GNPI0936 and GNPI0937 are available.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.

Table A-13-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-13

System	System Name	PFSSD Function*	Comments
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
SA	ESFAS	S	Status panel input for valves ABHV0005 and ABHV0006 may be affected.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-13.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the main control room to achieve and maintain hot standby if a fire occurs in area A-13. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs

It may be necessary to control ABPV0002 using local control station ABFHC0002. This action can be performed by an operator in fire area A-23. Emergency lighting and communication are available.

3.1.2 Steam Generator Blowdown to Blowdown Flash Tank Isolation

If a fire occurs in area A-13, BMHV0002 and BMHV0003 may not close using their associated hand switch in the main control room. Therefore, use BMHIS0002C and BMHIS0003C located on the BM157 panel in the Radwaste Control room to close valves BMHV0002 and BMHV0003.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Steam Generator ARVs

ARVs ABPV0001 and ABPV0004 may spuriously open. If this occurs, place ABPIC0001A and ABPIC0004A in manual and control the ARVs from the main control room.

3.2.7 Spurious SI

If a fire-induced spurious SI signal is received, enter EMG E-0 and terminate the spurious SI.

3.2.8 Main Steam Isolation Valves (MSIVs) and MSIV Bypass Valves

Cables for hand switch ABHS0079 may be damaged by the fire. Cables for redundant hand switch ABHS0080 are unaffected. Use ABHS0080 to close the MSIVs and MSIV bypass valves.

3.2.9 Main Feedwater Isolation Valves (MFIVs)

Cables for hand switch AEHS0081 may be damaged. Cables for redundant hand switch AEHS0080 are unaffected. Use AEHS0080 to close the MFIVs.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None specific to PFSSD for a fire in this area.

4.0 CONCLUSION

Redundant post fire safe shutdown capability, unaffected by a severe design basis fire, does not exist in area A-13. However, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-13.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-13

PFSSD components (S. in E-15000) located in fire area A-13 are shown in Table A-13-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-13-3.

Table A-13-3 PFSSD Equipment Located in Fire Area A-13				
Room #	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
1325	ALPT0024	Motor Driven Aux Feedwater Pump PAL01B Suction Pressure	5.1.1	
1325	DPAL01B	Auxiliary Feedwater Pump B Motor	5.1.1	
1325	DSGF02B	Auxiliary Feedwater Pump Room B Cooler Motor	5.1.2	
1325	GFHIS0016	Aux Feedwater Pump Room B Cooler Local Hand Switch	5.1.2	

5.1.1 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire AFW demand to achieve cold shutdown.

Fire Area A-13 contains the Train B motor driven auxiliary feedwater pump PAL01B and associated cables and components. Therefore, if a fire occurs in this area, operators cannot rely on Train B auxiliary feedwater.

Cable 14ALI09AA, associated with flow transmitter ALFT0007, is run in this area. This flow transmitter provides a signal to throttle valve ALHV0007 to prevent overflowing into steam generator A. Damage to this cable could prevent proper operation of the valve. This is acceptable for PFSSD since steam generator A is not credited in the event of a fire in this area.

Cable 12ABK01AF is a control cable for valve ABHV0005. Cable 12SAZ23AA is a status panel input for valve ABHV0005. Cable 12ABK01BF is a control cable for valve ABHV0006. Cable 12SAZ23BA is a status panel input for valve ABHV0006. Valves ABHV0005 and ABHV0006 are the only two steam supply valves to the TDAFP. Damage to these cables could prevent the valves from opening, which would prevent operation of the TDAFP. The Train A MDAFP remains available if a fire occurs in this area.

Cable 12ALI07KD is associated with TDAFP suction pressure transmitter ALPT0026. Damage to this cable will cause a loss of pressure indication in the main control room. As stated previously, the Train A MDAFP is credited for a fire in this area so damage to this cable will have no adverse impact on PFSSD.

Cable 12ALI08BA is associated with pressure transmitter ALPT0038. Cable 14ALI08CA is associated with pressure transmitter ALPT0039. Damage to these cables could cause a spurious low suction pressure signal (2/3 logic) and initiate auxiliary feedwater suction swap over to the ESW system. This is acceptable for PFSSD since the ESW system is the safety related water source for AFW.

Cable 14ALI07AD is associated with Steam Generator D flow transmitter ALFT0001. Steam generator D is not credited for a fire in area A-13 so damage to this cable will not affect PFSSD.

Several cables associated with TDAFP trip and throttle valve FCHV0312 and speed governing valve FCFV0313 are run in area A-13. Damage to these cables could prevent operation of the TDAFP. The Train A MDAFP is available if a fire occurs in area A-13.

Cable 14FCK21AA, associated with TDAFP steam trap isolation valve FCFV0310, is run in this area. This 1-inch valve is required to be closed to prevent steam flow through the trap. An intra-cable hot short will not prevent closing the valve from the main control room. An inter-cable hot short could prevent closing the valve from the main control room. Loss of steam through a 1-inch line is bounded by the main steam line break analysis and loss of steam through this line will not result in uncontrolled cooldown. Therefore, if the valve remains open, PFSSD is still assured.

In addition to the valves described above, several additional valves in the AFW system could be affected by a fire in this area. These valves are located in the Train B MDAFP and TDAFP flowpath and are listed in Table A-13-4. Spurious operation of these valves will not affect PFSSD since Train A MDAFP is available.

Based on the above discussion, the Train A MDAFP is available to supply auxiliary feedwater to steam generators B and C. The Train B MDAFP and the TDAFP are not available.

References: XX-E-013, E-15000, E-13AB01, E-13AB01A, E-13AL01A, E-13AL01B, E-13AL02B, E-13AL03A, E-13AL03B, E-13AL04B, E-13AL05A, E-13AL05B, E-13AL07B, E-13AL08, E-13FC21, E-13FC23, E-13FC24, E-13RP09, E-13SA23, E-1F9202, E-1F9204, M-12AB02, M-12AL01, M-12FC02

5.1.2 Auxiliary Feedwater Pump Room Cooler

The Train B auxiliary feedwater pump room cooler SGF02B and associated cables are located in area A-13. Therefore, if a fire occurs in this area, operators cannot rely on Train B auxiliary feedwater.

Cables and components associated with Train A auxiliary feedwater pump room cooler SGF02A are run in a separate fire area and are unaffected by a fire in area A-13. Therefore, Train A AFW pump room cooling is available if a fire occurs in area A-13.

References: XX-E-013, E-15000, E-13AL01A, E-13AL01B, E-13GF01, E-1F9444, M-12GF01

5.2 PFSSD CABLE EVALUATION

Table A-13-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-13. The applicable evaluation section is also listed in Table A-13-4.

Table A-13-4
PFSSD Cables Located in Fire Area A-13

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ABI20EA	1325	ABPV0001	I	5.2.1	SG A Steam line Pressure (ABPT0001)
11ABI21JA	1325	ABPT0514	I	5.2.2	Steam Generator A Pressure
11ABI21UA	1325	ABPT0544	I	5.2.2	Steam Generator D Pressure
12ABI20FE	1325	ABPV0002	I	5.2.1	SG B ARV Pressure Controller (ABPY0002)
12ABI20FH	1325	ABPV0002	I	5.2.1	SG B Steam line Pressure (ABPT0002)
12ABI21KA	1325	ABPT0515	I	5.2.2	Steam Generator A Pressure
12ABI21NA	1325	ABPT0525	I	5.2.2	Steam Generator B Pressure
12ABI21SA	1325	ABPT0535	I	5.2.2	Steam Generator C Pressure
12ABI21VA	1325	ABPT0545	I	5.2.2	Steam Generator D Pressure
12ABK01AF	1325	ABHV0005	C	5.1.1	Main STM Loop 2 To TDAFW Pump
12ABK01BF	1325	ABHV0006	C	5.1.1	Main STM Loop 3 To TDAFW Pump
12ALI07KD	1325	ALPT0026	I	5.1.1	TDAFWP Suction Pressure
12ALI08BA	1325	ALPT0038	I	5.1.1	ESFAS AFW Low Suction Press Transmitter
12FCK23AD	1325	FCHV0312	C	5.1.1	AFWP Turbine Mech Trip/Throttle Vlv
12FCK23AR	1325	FCHV0312	P	5.1.1	AFWP Turbine Mech Trip/Throttle Vlv
12FCK23AS	1325	FCHV0312	C	5.1.1	AFWP Turbine Mech Trip/Throttle Vlv
12FCK23AX	1325	FCHV0312 FCFV0313	C	5.1.1	AFWP Turbine Mech Trip/Throttle Vlv AFWP Turbine Speed Governing Valve
12FCK24AA	1325	FCFV0313	C	5.1.1	TDAFWP Speed Governing Valve
12FCK24AK	1325	FCFV0313	I	5.1.1	TDAFWP Speed Governing Valve
12SAZ23AA	1325	ABHV0005	C	5.1.1	Main STM Loop 2 To TDAFW Pump
12SAZ23BA	1325	ABHV0006	C	5.1.1	Main STM Loop 3 To TDAFW Pump
14ABI20HH	1325	ABPV0004	I	5.2.1	SG D Steam line Pressure (ABPT0004)

Table A-13-4
PFSSD Cables Located in Fire Area A-13

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ABI21LA	1325	ABPT0516	I	5.2.2	Steam Generator A Pressure
14ABI21WA	1325	ABPT0546	I	5.2.2	Steam Generator D Pressure
14ABK23FC	1325	ABHV0018	C	5.2.3	MSIV ABHV0017 Bypass Valve
14ABK23FD	1325	ABHV0021	C	5.2.3	MSIV ABHV0020 Bypass Valve
14ABK28AH	1325	ABHV0017	C	5.2.3	Main Steam Isolation Valve Loop 2
14ABK29BH	1325	ABHV0020	C	5.2.3	Main Steam Isolation Valve Loop 3
14AEK16AH	1325	AEFV0040	C	5.2.4	SG B Feedwater Isolation Valve
14AEK17BH	1325	AEFV0041	C	5.2.4	SG C Feedwater Isolation Valve
14ALB01BA	1325	DPAL01B	P	5.1.1	Aux Feedwater Pump Motor
14ALG02AA	1325	ALHV0034	P	5.1.1	CST to Train B MDAFP
14ALG02AB	1325	ALHV0034	C	5.1.1	CST to Train B MDAFP
14ALG04AA	1325	ALHV0030	P	5.1.1	ESW to Train B MDAFP
14ALG04AB	1325	ALHV0030	C	5.1.1	ESW to Train B MDAFP
14ALG04DA	1325	ALHV0033	P	5.1.1	Train B ESW to TDAFP
14ALG04DB	1325	ALHV0033	C	5.1.1	Train B ESW to TDAFP
14ALI03AJ	1325	ALHV0005	I	5.1.1	Train B MDAFP to SG D
14ALI03AK	1325	ALHV0005	I	5.1.1	Train B MDAFP to SG D
14ALI03AL	1325	ALHV0005	I	5.1.1	Train B MDAFP to SG D
14ALI03BD	1325	ALHV0007	I	5.1.1	Train B MDAFP to SG A
14ALI03BE	1325	ALHV0007	I	5.1.1	Train B MDAFP to SG A
14ALI03BF	1325	ALHV0007	I	5.1.1	Train B MDAFP to SG A
14ALI05AG	1325	ALHV0010	I	5.1.1	TDAFP to SG B
14ALI05AH	1325	ALHV0010	I	5.1.1	TDAFP to SG B

Table A-13-4
PFSSD Cables Located in Fire Area A-13

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALI05AJ	1325	ALHV0010	I	5.1.1	TDAFP to SG B
14ALI05BD	1325	ALHV0012	I	5.1.1	TDAFP to SG C
14ALI05BE	1325	ALHV0012	I	5.1.1	TDAFP to SG C
14ALI05BF	1325	ALHV0012	I	5.1.1	TDAFP to SG C
14ALI07AD	1325	ALFT0001	I	5.1.1	Aux Feedwater Flow to SG D
14ALI07HD	1325	ALPT0024	I	5.1.1	Train B MDAFP Suction Pressure
14ALI08CA	1325	ALPT0039	I	5.1.1	ESFAS AFW Low Suction Press Transmitter
14ALI09AA	1325	ALFT0007	I	5.1.1	Aux Feedwater Flow to SG A
14BMK06BA	1325	BMHV0002	C	5.2.5	SG B to Blowdown Flash Tank Iso valve
14BMK06CA	1325	BMHV0003	C	5.2.5	SG C to Blowdown Flash Tank Iso valve
14FCK21AA	1325	FCFV0310	C	5.1.1	TDAFW Pump Steam Trap Iso Valve
14GFG01BA	1325	DSGF02B	P	5.1.2	Train B MDAFP Room Cooler Motor
14GFG01BB	1325	DSGF02B	C	5.1.2	MDAFP B Cooler Hand Switch GFHIS0016

5.2.1 Steam Generator Atmospheric Relief Valves

Cables associated with steam generator atmospheric relief valves (ARVs) ABPV0001, ABPV0002 and ABPV0004 are run in area A-13. The effects of fire damage to these cables are discussed in the following paragraphs.

Cable 11ABI20EA provides a signal from pressure transmitter ABPT0001 to ARV ABPV0001 controller and opens the valve when steam line pressure reaches a designated set point. Damage to this cable due to a fire could cause a spurious high pressure signal which would open the ARV. If this occurs, operators can place ABPIC0001A in manual and control the ARV from the main control room. Cables associated with the ARV controller I/P device (ABPY0001) do not run in area A-13.

Cable 12ABI20FE provides a signal from ARV ABPV0002 controller to pressure transducer ABPY0002. Cable 12ABI20FH provides a signal from ABPT0002 to ARV ABPV0002 controller. The transducer signals the position controller (ABZC0002) on ABPV0002 to open whenever steam line pressure reaches a designated set point. Damage to the cables due to a fire could cause a spurious signal which could open the ARV. Damage to cable 12ABI20FE could prevent manual operation of the valve from the main control room. Therefore, it may be necessary to control ABPV0002 using local controller ABFHC0002 in area A-23.

Cable 14ABI20HH provides a signal from ABPT0004 to ARV ABPV0004 controller and opens the valve when steam line pressure reaches a designated set point. Damage to this cable due to a fire could cause a spurious high pressure signal which would open the ARV. If this occurs, operators can place ABPIC0004A in manual and control the ARV from the main control room. Cables associated with the ARV controller I/P device (ABPY0004) do not run in area A-13.

Based on the above discussion, ARVs ABPV0001 and ABPV0004 can be controlled manually from the main control room using ABPIC0001A and ABPIC0004A, respectively. ARV ABPV0002 may need to be controlled using local controller ABFHC0002.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB20A, E-13AB20B, E-1F9101, M-12AB01

5.2.2 Safety Injection and Containment Spray

Calculation XX-E-013, Appendix 1 (PFSSD Support Section) provides a detailed discussion about the potential PFSSD impact of a spurious safety injection signal (SIS) and spurious containment spray actuation signal (CSAS). This section discusses the specific PFSSD impact if a fire occurs in this area.

A spurious CSAS cannot occur if a fire occurs in area A-13.

Cables associated with steam line pressure transmitters ABPT0514, ABPT0515, ABPT0516, ABPT0525, ABPT0535, ABPT0544, ABPT0545, and ABPT0546 are run in area A-13. Consequently, the two out of three logic for low steam line pressure initiation of SIS can be satisfied on steam generators A and D if a fire occurs in area A-13.

A spurious SIS starts the charging sequence which starts the CCPs and opens the BIT flowpath valves. For a fire in this area, the BIT flowpath valves are unaffected and would open on a SIS. The RWST valves are unaffected and would open on a SIS. Also, the CCP mini flow valves are unaffected and CCW flow to the seal water heat exchanger is unaffected to ensure cooling of the recirc flow and RCP seal return. CCW flow is available for the CCP oil

coolers. Therefore, the charging pumps will not be affected by a spurious SIS caused by a fire in this area.

A start of the credited CCW system (Train A) will not adversely impact the system. The Train A ESW system is unaffected and will start on a spurious SIS, providing necessary cooling water to the CCW heat exchanger.

A start of the AFW pumps will not adversely impact PFSSD. The Train A AFW pump is credited for a fire in this area. Suction from the CST to the Train A AFW pump is unaffected. Discharge flow will either return to the CST or flow to the steam generators through the discharge control valves. Therefore, the Train A AFW pump is unaffected by a spurious SIS caused by a fire in this area.

A start of the RHR pumps due to a spurious SIS will not adversely impact either pump. The RWST supply to the pumps is not affected and the recirculation valves will remain in the open position. Component cooling water is available to both RHR heat exchangers. Operators will have time to terminate the spurious SIS and stop the pumps.

Based on the above discussion, a SIS due to spurious low steam line pressure can occur if a fire occurs in this area. Credited PFSSD equipment will not be damaged by the spurious SIS. Therefore, the spurious SIS will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13AB21, E-13BG01A, E-13EM01, E-1F9431, E-1F9432, M-12AB01, M-12BG03, M-12EM01

5.2.3 Steam Generator Main Steam Isolation Valves (MSIVs) and Bypass Valves

PFSSD requires the MSIVs be closed to prevent reactivity addition due to uncontrolled cooldown. The MSIVs are closed from the control room using all close hand switches ABHS0079 or ABHS0080.

Each MSIV is designed to utilize system fluid (main steam) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main steam. This is done by actuating either all close hand switch ABHS0079 (separation group 4) or ABHS0080 (separation group 1) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MSIV	ABHS0079 (Sep Group 4)		ABHS0080 (Sep Group 1)	
	Solenoids	Cable	Solenoids	Cable
ABHV0011	MV2, MV4, MV6	14ABK28BH	MV1, MV3, MV5	11ABK29BH
ABHV0014	MV2, MV4, MV6	14ABK29AH	MV1, MV3, MV5	11ABK28AH
ABHV0017	MV2, MV4, MV6	14ABK28AH	MV1, MV3, MV5	11ABK29AH
ABHV0020	MV2, MV4, MV6	14ABK29BH	MV1, MV3, MV5	11ABK28BH

Cables 14ABK28AH and 14ABK29BH associated with ABHV0017 and ABHV0020 are run in fire area A-13. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 1 cables associated with hand switch ABHS0080 are unaffected by a fire in area A-13. Therefore, hand switch ABHS0080 is available to close the four MSIVs.

Based on the above discussion, hand switch ABHS0080 is available to close the MSIVs in the event of a fire in area A-13.

References: E-15000, XX-E-013, E-13AB23A, E-13AB23B, E-13AB26, E-13AB27, E-13AB28, E-13AB29, E-1F9101, M-12AB02

5.2.4 Steam Generator Main Feedwater Isolation Valves

PFSSD requires that either the main feedwater isolation valves (MFIVs) be closed or the main feedwater pumps be stopped to prevent overfilling the steam generators. Flow diversion from auxiliary feedwater (AFW) to the main feedwater system piping is prevented by check valves AEV0420, AEV0421, AEV0422 and AEV0423. Closure of the main feedwater isolation valves is not required to prevent AFW flow diversion.

Each MFIV is designed to utilize system fluid (feedwater) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main feedwater. This is done by actuating either all close hand switch AEHS0080 (separation group 1) or AEHS0081 (separation group 4) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MFIV	AEHS0080 (Sep Group 1)		AEHS0081 (Sep Group 4)	
	Solenoids	Cable	Solenoids	Cable
AEFV0039	MV1, MV3, MV5	11AEK16AH	MV2, MV4, MV6	14AEK17AH
AEFV0040	MV1, MV3, MV5	11AEK17AH	MV2, MV4, MV6	14AEK16AH
AEFV0041	MV1, MV3, MV5	11AEK16BH	MV2, MV4, MV6	14AEK17BH
AEFV0042	MV1, MV3, MV5	11AEK17BH	MV2, MV4, MV6	14AEK16BH

Cables 14AEK16AH and 14AEK17BH associated with AEFV0040 and AEFV0041 are run in fire area A-13. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 1 cables associated with hand switch AEHS0080 are unaffected by a fire in area A-13. Therefore, hand switch AEHS0080 is available to close the four MFIVs.

Based on the above discussion, MFIV isolation is assured using hand switch AEHS0080.

References: E-15000, XX-E-013, E-13AE14, E-13AE15, E-13AE16, E-13AE17, E-1F9201, M-12AE02

5.2.5 Steam Generator Blowdown to Blowdown Flash Tank Valves

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown. The air operated valves are normally open and each valve is controlled by three solenoid valves. All three solenoid valves are required to be energized to open the valve. If any one solenoid is de-energized, the associated valve will close or remain closed. Only two of the three solenoids for each valve are considered in the PFSSD analysis, so the third solenoid is assumed energized throughout the event.

Cables 14BMK06BA and 14BMK06CA associated with one of the three solenoid valves on BMHV0002 and BMHV0003, respectively, are run in area A-13. A hot short within cables 14BMK06BA and 14BMK06CA will not cause the valves to spuriously open due to the absence of a +125 VDC source conductor. However, the cables are run in raceway that could contain other cables carrying 125 VDC that, if an inter-cable hot short occurs, could spuriously open

the valves and prevent them from being closed using hand switches BMHIS0002A and BMHIS0003A. Although this is unlikely due to the use of thermoset cables, it is postulated to occur for the purpose of this analysis.

Cables associated with the other credited solenoid valve for BMHV0002 and BMHV0003 are not run in area A-13. To de-energize this solenoid, an operator will have to use the respective hand switch (BMHIS0002C and BMHIS0003C) at the BM157 panel in the Radwaste Control Room.

Based on the above discussion, a fire in area A-13 will not prevent closing steam generator blowdown valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004.

Thermal hydraulic analysis WCNOC-CP-002 shows insignificant impact on SG inventory even with all four blowdown valves open. Therefore, no E-1F9900 OMA is required to close blowdown valves to achieve and maintain hot standby. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 34.

References: E-15000, XX-E-013, E-13BM06A, E-13BM06C, E-13BM06D, E-1F9101, M-12BM01

FIRE AREA A-14

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-14 is located on the 2000 elevation of the Auxiliary Building and includes the room listed in Table A-14-1.

Table A-14-1
Rooms Located in Fire Area A-14

ROOM #	DESCRIPTION
1326	Aux Feedwater Pump Room A

Fire area A-14 is protected with automatic smoke detection. There is no automatic fire suppression installed. The room is separated from adjacent areas by minimum 3-hour fire rated barriers.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-14-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-14-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-14

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The controller for Steam Generator A ARV (ABPV0001) may need to placed in manual so the ARV can be controlled from the control room. Cables for hand switch ABHS0080 may be damaged by the fire. Cables for redundant hand switch ABHS0079 are unaffected. Use ABHS0079 to close the MSIVs and MSIV bypass valves.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
AE	Main Feedwater	H, P	Cables for hand switch AEHS0080 may be damaged. Cables for redundant hand switch AEHS0081 are unaffected. Use AEHS0081 to close the MFIVs.
AL	Aux. Feedwater System	H, P	The Train A MDAFP may be unavailable. The Train B MDAFP is unaffected.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.

Table A-14-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-14

System	System Name	PFSSD Function*	Comments
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
GF	AFW Pump Room Coolers	S	The Train A AFW pump room cooler and associated cables are located in this area. The Train B AFW pump room cooler and cables are unaffected.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.

Table A-14-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-14

System	System Name	PFSSD Function*	Comments
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.

Table A-14-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-14

System	System Name	PFSSD Function*	Comments
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-14.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-14. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Steam Generator ARVs

ARV ABPV0001 may spuriously open. If this occurs, place ABPIC0001A in manual and control the ARV from the control room.

3.2.2 Main Steam Isolation Valves (MSIVs) and MSIV Bypass Valves

Cables for hand switch ABHS0080 may be damaged by the fire. Cables for redundant hand switch ABHS0079 are unaffected. Use ABHS0079 to close the MSIVs and MSIV bypass valves.

3.2.3 Main Feedwater Isolation Valves (MFIVs)

Cables for hand switch AEHS0080 may be damaged. Cables for redundant hand switch AEHS0081 are unaffected. Use AEHS0081 to close the MFIVs.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None specific to PFSSD for a fire in this area.

4.0 CONCLUSION

Post Fire Safe Shutdown is assured for a fire in area A-14. Redundant capability exists and is unaffected by a fire.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-14.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-14

PFSSD components (S. in E-15000) located in fire area A-14 are shown in Table A-14-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-14-3.

Table A-14-3
PFSSD Equipment Located in Fire Area A-14

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1326	ALPT0025	Motor Driven Aux Feedwater Pump PAL01A Suction Pressure	5.1.1	
1326	DPAL01A	Auxiliary Feedwater Pump Motor	5.1.1	
1326	DSGF02A	Auxiliary Feedwater Pump Room A Cooler Motor	5.1.2	
1326	GFHIS0015	Aux Feedwater Pump Room A Cooler Local Hand Switch	5.1.2	

5.1.1 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire AFW demand to achieve cold shutdown.

Fire Area A-14 contains the Train A MDAFP PAL01A and associated cables and components. Therefore, if a fire occurs in this area, operators cannot rely on Train A auxiliary feedwater.

Cables associated with Train A auxiliary feedwater flowpath valves are run in area A-14. These cables are listed in Table A-14-4. Damage to these cables could impact the ability to supply auxiliary feedwater to steam generators B and C using Train A MDAFP. The CST supply to the TDAFP could be affected. The TDAFP to steam generators A and D flowpath could be affected. The TDAFP remains available to supply steam generators B and C using Train B ESW.

Pressure transmitters ALPT0037, ALPT0038 and ALPT0039 monitor CST pressure and initiate swap over to ESW on 2/3 low suction pressures (LSP). A cable associated with pressure transmitter ALPT0037 runs in this area. Cables associated with the other two pressure transmitters are unaffected. Therefore, spurious LSP swap over will not occur in the event of a fire in this area.

Cables associated with flow transmitters ALFT0009 and ALFT0011 run in this area. These flow transmitters provide a signal to throttle valves ALHV0009 and ALHV0011, respectively, to prevent overflowing into steam generators B and C. Damage to these cables could prevent proper operation of the valves. This is acceptable for PFSSD since steam generators B and C are not credited in the event of a fire in this area.

The assured auxiliary feedwater flowpath in the event of a fire in area A-14 is the Train B MDAFP taking suction from the CST and supplying steam generators A and D via valves ALHV0005 and ALHV0007. The TDAFP is also available to supply steam generators B and C, but the only assured suction source is the ESW system which meets PFSSD requirements but introduces commercial concerns.

References: XX-E-013, E-15000, E-13AL01A, E-13AL01B, E-13AL02A, E-13AL03A, E-13AL04A, E-13AL05A, E-13AL07A, E-13AL08, E-13AL09, E-1F9202, E-1F9203, E-1F9204, M-12AL01

5.1.2 Auxiliary Feedwater Pump Room Cooler

The Train A auxiliary feedwater pump room cooler SGF02A and associated cables are located in area A-14. Therefore, if a fire occurs in this area, operators cannot rely on Train A auxiliary feedwater.

Cables and components associated with Train B auxiliary feedwater pump room cooler SGF02B are run in a separate fire area and are unaffected by a fire in area A-14. Therefore, Train B AFW pump room cooling is available if a fire occurs in area A-14.

References: XX-E-013, E-15000, E-1F9444, E-13AL01A, E-13AL01B, E-13GF01, M-12GF01

5.2 PFSSD CABLE EVALUATION

Table A-14-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-14. The applicable evaluation section is also listed in Table A-14-4.

Table A-14-4
PFSSD Cables Located in Fire Area A-14

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ABI20EA	1326	ABPV0001	I	5.2.1	SG A Streamline Pressure (ABPT0001)
11ABI21JA	1326	ABPT0514	I	5.2.2	Steam Generator A Pressure
11ABI21MA	1326	ABPT0524	I	5.2.2	Steam Generator B Pressure
11ABI21RA	1326	ABPT0534	I	5.2.2	Steam Generator C Pressure
11ABI21UA	1326	ABPT0544	I	5.2.2	Steam Generator D Pressure
11ABK23AA	1326	ABHY0012A	C	5.2.3	Loop 4 MSIV Bypass Solenoid Valve
11ABK23AB	1326	ABHY0015A	C	5.2.3	Loop 1 MSIV Bypass Solenoid Valve
11ABK23AC	1326	ABHY0018A	C	5.2.3	Loop 2 MSIV Bypass Solenoid Valve
11ABK23AD	1326	ABHY0021A	C	5.2.3	Loop 3 MSIV Bypass Solenoid Valve
11ABK28AH	1326	ABHV0014	C	5.2.3	Loop 1 Main Steam Iso Valve
11ABK28BH	1326	ABHV0020	C	5.2.3	Loop 3 Main Steam Iso Valve
11ABK29AH	1326	ABHV0017	C	5.2.3	Loop 2 Main Steam Iso Valve
11ABK29BH	1326	ABHV0011	C	5.2.3	Loop 4 Main Steam Iso Valve
11AEK16BH	1326	AEFV0041	C	5.2.4	SG C Feedwater Isolation Valve
11AEK17AH	1326	AEFV0040	C	5.2.4	SG B Feedwater Isolation Valve
11ALB01AA	1326	DPAL01A	P	5.1.1	Aux Feedwater Pump Motor
11ALG02BA	1326	ALHV0035	P	5.1.1	CST to MDAFP A Suction Iso Valve
11ALG02BB	1326	ALHV0035	C	5.1.1	CST to MDAFP A Suction Iso Valve
11ALG02CA	1326	ALHV0036	P	5.1.1	CST to TDAFP Suction Iso Valve
11ALG02CB	1326	ALHV0036	C	5.1.1	CST to TDAFP Suction Iso Valve
11ALG04BA	1326	ALHV0031	P	5.1.1	ESW to MDAFP A Suction Iso Valve
11ALG04BB	1326	ALHV0031	C	5.1.1	ESW to MDAFP A Suction Iso Valve
11ALG04CA	1326	ALHV0032	P	5.1.1	Train A ESW to TDAFP Suction Iso Valve

Table A-14-4
PFSSD Cables Located in Fire Area A-14

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ALG04CB	1326	ALHV0032	C	5.1.1	Train A ESW to TDAFP Suction Iso Valve
11ALI03AD	1326	ALHV0009	I	5.1.1	MDAFP A to SG B Iso Valve
11ALI03AE	1326	ALHV0009	I	5.1.1	MDAFP A to SG B Iso Valve
11ALI03AF	1326	ALHV0009	I	5.1.1	MDAFP A to SG B Iso Valve
11ALI03BD	1326	ALHV0011	I	5.1.1	MDAFP A to SG C Iso Valve
11ALI03BE	1326	ALHV0011	I	5.1.1	MDAFP A to SG C Iso Valve
11ALI03BF	1326	ALHV0011	I	5.1.1	MDAFP A to SG C Iso Valve
11ALI05AD	1326	ALHV0006	I	5.1.1	TDAFP to SG D Iso Valve
11ALI05AE	1326	ALHV0006	I	5.1.1	TDAFP to SG D Iso Valve
11ALI05AF	1326	ALHV0006	I	5.1.1	TDAFP to SG D Iso Valve
11ALI05BD	1326	ALHV0008	I	5.1.1	TDAFP to SG A Iso Valve
11ALI05BE	1326	ALHV0008	I	5.1.1	TDAFP to SG A Iso Valve
11ALI05BF	1326	ALHV0008	I	5.1.1	TDAFP to SG A Iso Valve
11ALI07JA	1326	ALPT0025	I	5.1.1	MDAFP A Suction Pressure
11ALI08AA	1326	ALPT0037	I	5.1.1	ESFAS AFW Low Suction Pressure Transmitter
11ALI09BA	1326	ALFT0009	I	5.1.1	AFW Flow to SG B
11ALI09CA	1326	ALFT0011	I	5.1.1	AFW Flow to SG C
11BMK06FA	1326	BMHV0002	C	5.2.5	SG B to Blowdown Flash Tank Iso Valve
11BMK06GA	1326	BMHV0003	C	5.2.5	SG C to Blowdown Flash Tank Iso Valve
11GFG01AA	1326	DSGF02A	P	5.1.2	Train A MDAFP Room Cooler Motor
11GFG01AB	1326	DSGF02A	C	5.1.2	MDAFP A Room Cooler Motor (GFHIS0015)

5.2.1 Steam Generator Atmospheric Relief Valves

One cable associated with steam generator atmospheric relief valve (ARV) ABPV0001 runs in area A-14. Cable 11ABI20EA provides a signal from pressure transmitter ABPT0001 to ARV ABPV0001 controller and opens the valve when steamline pressure reaches a designated setpoint. Damage to this cable due to a fire could cause a spurious high pressure signal which would open the ARV. If this occurs, operators can place ABPIC0001A in manual and control the ARV from the control room. Position indication for ABPV0001 on RL006 remains available, so operators would quickly recognize if the ARV is open. Cables associated with the ARV controller I/P device (ABPY0001) do not run in area A-14.

Based on the above discussion, damage to cable 11ABI20EA will not impact the ability to control ARV ABPV0001 from the control room.

References: E-15000, XX-E-013, E-13AB20A, E-1F9101, M-12AB01

5.2.2 Safety Injection and Containment Spray

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. A spurious containment spray actuation signal (CSAS) could cause the containment spray pumps to operate, depleting inventory in the RWST. These conditions are not desirable for PFSSD at Wolf Creek.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and, ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Containment spray (CS) is initiated automatically by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937. There are no containment pressure transmitter cables in area A-14. Consequently, a spurious CSAS due to high containment pressure cannot occur if a fire occurs in area A-14. Also, a spurious SIS due to high containment pressure cannot occur since none of the three containment pressure SIS initiators have cables located in area A-14.

Cables associated with steam line pressure transmitters ABPT0514, ABPT0524, ABPT0534 and ABPT0544 are run in area A-14. Consequently, the two out of three logic for low steam line pressure initiation of SIS cannot be satisfied if a fire occurs in area A-14.

Based on the above discussion, a spurious SIS and CSAS cannot occur if a fire occurs in area A-14.

References: E-15000, XX-E-013, E-13AB21, E-1F9431, E-1F9432, E-1F9433, M-12AB01

5.2.3 Steam Generator Main Steam Isolation Valves (MSIVs) and Bypass Valves

PFSSD requires the MSIVs be closed to prevent reactivity addition due to uncontrolled cooldown. The MSIVs are closed from the control room using all close hand switches ABHS0079 or ABHS0080.

Each MSIV is designed to utilize system fluid (main steam) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main steam. This is done by actuating either all close hand switch ABHS0079 (separation group 4) or ABHS0080 (separation group 1) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MSIV	ABHS0079 (Sep Group 4)		ABHS0080 (Sep Group 1)	
	Solenoids	Cable	Solenoids	Cable
ABHV0011	MV2, MV4, MV6	14ABK28BH	MV1, MV3, MV5	11ABK29BH
ABHV0014	MV2, MV4, MV6	14ABK29AH	MV1, MV3, MV5	11ABK28AH
ABHV0017	MV2, MV4, MV6	14ABK28AH	MV1, MV3, MV5	11ABK29AH
ABHV0020	MV2, MV4, MV6	14ABK29BH	MV1, MV3, MV5	11ABK28BH

All 4 cables associated with the 12 separation group 1 solenoid valves are run in area A-14. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 4 cables associated with hand switch ABHS0079 are unaffected by a fire in area A-14. Therefore, hand switch ABHS0079 is available to close the four MSIVs.

Based on the above discussion, hand switch ABHS0079 is available to close the MSIVs in the event of a fire in area A-14.

References: E-15000, XX-E-013, E-13AB23A, E-13AB23B, E-13AB26, E-13AB27, E-13AB28, E-13AB29, E-1F9101, M-12AB02

5.2.4 Steam Generator Main Feedwater Isolation Valves

PFSSD requires that either the main feedwater isolation valves (MFIVs) be closed or the main feedwater pumps be stopped to prevent overfilling the steam generators. Flow diversion from auxiliary feedwater (AFW) to the main feedwater system piping is prevented by check valves AEV0420, AEV0421, AEV0422 and AEV0423. Closure of the main feedwater isolation valves is not required to prevent AFW flow diversion.

Each MFIV is designed to utilize system fluid (feedwater) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main feedwater. This is done by actuating either all close hand switch AEHS0080 (separation group 1) or AEHS0081 (separation group 4) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MFIV	AEHS0080 (Sep Group 1)		AEHS0081 (Sep Group 4)	
	Solenoids	Cable	Solenoids	Cable
AEFV0039	MV1, MV3, MV5	11AEK16AH	MV2, MV4, MV6	14AEK17AH
AEFV0040	MV1, MV3, MV5	11AEK17AH	MV2, MV4, MV6	14AEK16AH
AEFV0041	MV1, MV3, MV5	11AEK16BH	MV2, MV4, MV6	14AEK17BH
AEFV0042	MV1, MV3, MV5	11AEK17BH	MV2, MV4, MV6	14AEK16BH

Cables 11AEK17AH and 11AEK16BH associated with valves AEFV0040 and AEFV0041 are run in area A-14. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 4 cables associated with hand switch AEHS0081 are unaffected by a fire in area A-8. Therefore, hand switch AEHS0081 is available to close the four MFIVs.

Based on the above discussion, MFIV isolation is assured using hand switch AEHS0081.

References: E-15000, XX-E-013, E-13AE14, E-13AE15, E-13AE16, E-13AE17, E-1F9201, M-12AE02

5.2.5 Steam Generator Blowdown to Blowdown Flash Tank Valves

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown. The air operated valves are normally open and each valve is controlled by three solenoid valves. All three solenoid valves are required to be energized to open the valve. If any one solenoid is de-energized, the associated valve will close or remain closed. Only two of the three solenoids for each valve are considered in the PFSSD analysis, so the third solenoid is assumed energized throughout the event.

Cables 11BMK06FA and 11BMK06GA, associated with BMHV0002 and BMHV0003, respectively, are run in area A-14. These cables are associated with the hand switch at the BM157 panel. An intra-cable short within these cables will have the same effect as if the valve is closed, which is the desired position. An open circuit will de-energize the AR, close the seal-in contact on schemes 5BMK06B and 5BMK06C, and energize solenoid valves BMHY0002C and BMHY0003C. A short to ground would not affect the circuit because the AR is energized by a floating 125 VDC system.

As stated above, an open circuit in cables 11BMK06FA and 11BMK06GA will prevent closing BMHV0002 and BMHV0003 from the Radwaste Control Room panel BM157. Damage to these cables will not prevent closing the blowdown valves from the Main Control Room.

Based on the above discussion, a fire in area A-14 will not prevent closing steam generator blowdown valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004.

References: E-15000, XX-E-013, E-13BM06A, E-13BM06C, E-13BM06D, E-1F9101, M-12BM01

FIRE AREA A-15

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-15 is located on the 2000 elevation of the Auxiliary Building and includes the room listed in Table A-15-1.

Table A-15-1
Room Located in Fire Area A-15

ROOM #	DESCRIPTION
1331	Turbine Driven Aux Feedwater Pump Room

The turbine driven auxiliary feedwater pump is protected with a manually actuated water spray system. Rate compensated heat detectors are installed around the pump. The room is also provided with automatic smoke detection at the ceiling.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-15-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-15-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-15

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Steam Generator B ARV ABPV0002 may need to be isolated using local controller ABFHC0002. Both steam supply valves (ABHV0005 and ABHV0006) to the TDAFP may be affected. MSIVs ABHV0017 and ABHV0020 may not close and MSIV bypass valves ABHV0018 and ABHV0021 could spuriously open. Operators may need to isolate redundant components located downstream of the MSIVs using hand switches in the main control room. Steam generator pressure indication is available using ABPI0514A, ABPI0515A, ABPI0516A, ABPI0526A, ABPI0536A, ABPI0544A, ABPI0545A and ABPI0546A.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
AE	Main Feedwater	H, P	AEFV0040 and AEFV0041 may not close using either hand switch AEHS0080 or AEHS0081. Main feedwater flow can be stopped from the control room using FCHS0018A, FCHS0018B, FCHS0118A, FCHS0118B and AEHIS0104.
AL	Aux. Feedwater System	H, P	The TDAFP (PAL02) and all four discharge valves are affected by a fire in this area. The Train A MDAFP (PAL01A) is unaffected but the discharge valves to steam generators B and C are affected. The Train B MDAFP (PAL01B) and associated discharge valves are unaffected and are available to provide auxiliary feedwater to steam generators A and D.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15. RCS pressure indication is available using BBPI0405 and BBPI0406. Pressurizer level indication is available using BBLI0459A and BBLI0460A.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
BM	Steam Generator Blowdown System	R, M, H	Blowdown valves BMHV0002 and BMHV0003 may have to be failed closed by opening breaker NK4411 in room 3404 (fire area C-15). This will also fail close BMHV0001 and BMHV0004, which is acceptable for PFSSD.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.

Table A-15-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-15

System	System Name	PFSSD Function*	Comments
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
EM	High Pressure Coolant Injection	R, M	A spurious start of the SI pumps due to two out of three low steam line pressures can be terminated by placing the pump control hand switches EMHIS0004 and EMHIS0005 on panel RL017 in pull-to-lock.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
FC	Auxiliary Turbines	R, H, P	The Turbine Driven Auxiliary Feedwater Pump may not be available if a fire occurs in this area. The pump and a number of associated components and cables are located in this area.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15. Containment pressure indicators GNPI0934, GNPI0935, GNPI0936 and GNPI0937 are available.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.

Table A-15-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-15

System	System Name	PFSSD Function*	Comments
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.

Table A-15-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-15

System	System Name	PFSSD Function*	Comments
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
SA	ESFAS	S	The status panel (SA066C) input for valves ABHV0005 and ABHV0006, associated with the TDAFP, could be affected. This is acceptable since the TDAFP is affected by a fire in area A-15.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-15.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-15. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator Blowdown

Blowdown valves BMHV0002 and BMHV0003 may have to be failed closed by opening breaker NK4411 in room 3404 (fire area C-15). This will also fail close BMHV0001 and BMHV0004.

3.1.2 Steam Generator ARVs

It may be necessary to isolate ABPV0002 using local control station ABFHC0002. This action can be performed by an operator in fire area A-23. Emergency lighting and communication are available.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.7 Spurious SI

If a fire-induced spurious SI signal is received, enter EMG E-0 and terminate the spurious SI.

3.2.8 Main Steam Isolation

MSIVs ABHV0017 and ABHV0020 may not close and MSIV bypass valves ABHV0018 and ABHV0021 could spuriously open. Operators may need to isolate redundant components located downstream of the MSIVs using applicable hand switches in the main control room.

3.2.9 Main Feedwater Isolation

Main feedwater isolation valves AEFV0040 and AEFV0041 may not close using either hand switch AEHS0080 or AEHS0081. Main feedwater flow can be stopped from the control room using FCHS0018A, FCHS0018B, FCHS0118A, FCHS0118B and AEHIS0104.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

With some exceptions, redundant Post Fire Safe Shutdown capability exists if a severe fire occurs in area A-15. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-15.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-15

PFSSD components (S. in E-15000) located in fire area A-15 are shown in Table A-15-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-15-3.

Table A-15-3
PFSSD Equipment Located in Fire Area A-15

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1331	ALPT0026	TDAFP Suction Pressure	5.1.1	
1331	FC219	TDAFP Electrical Control Panel	5.1.1	
1331	FCFV0313	TDAFP Speed Governing Valve	5.1.1	
1331	FCHS0332A	AFWP Turbine Trip Local Push Button on FC219	5.1.1	
1331	FCHV0312	TDAFP Mechanical Trip and Throttle Valve	5.1.1	
1331	FCSC0313	TDAFP Speed Controller	5.1.1	
1331	FCSE0313A	TDAFP Overspeed Monitor Speed Sensor	5.1.1	
1331	FCSI0313A	TDAFP Turbine Speed and Setpoint Indicator	5.1.1	
1331	FCSI0313B	TDAFP Turbine Speed and Setpoint Indicator	5.1.1	
1331	FCZC0313	TDAFP Turbine Speed Governing Valve Positioner	5.1.1	
1331	FCZS0312D	TDAFP Overspeed Trip Limit Switch	5.1.1	
1331	KFC02	Auxiliary Feedwater Pump PAL02 Turbine	5.1.1	
1331	PAL02	Turbine Driven Auxiliary Feedwater Pump	5.1.1	
1331	TVFC04	KFC02 Terminal Box	5.1.1	

5.1.1 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

Fire area A-15 contains the TDAFP PAL02 and associated cables and components as shown in Table A-15-3 and A-15-4. A fire in this area could prevent operation of the TDAFP. Therefore, one of the motor driven auxiliary feedwater pumps will need to be used if a fire occurs in this area. The following paragraphs discuss availability of the motor driven auxiliary feedwater pumps.

Cables associated with a number of valves in the auxiliary feedwater system are run in area A-15. These valves are in the discharge piping from the auxiliary feedwater pumps to the steam generators. The cables and associated valves are shown in Table A-15-4. Only valves ALHV0005 and ALHV0007 are unaffected by a fire in this area. These valves are in the piping from the Train B MDAFP to steam generators A and D. The Train B MDAFP is unaffected by a fire in this area. Therefore, auxiliary feedwater flow to at least 2 steam generators can be achieved if a fire occurs in area A-15.

Cables associated with pressure transmitters ALPT0037, ALPT0038 and ALPT0039 are run in area A-15. Damage to these cables could cause a spurious low suction pressure signal (2/3 logic) and initiate auxiliary feedwater suction swapover to the ESW system. This is acceptable for PFSSD since the ESW system is the safety related water source for AFW.

References: E-15000, XX-E-013, E-13AB01, E-13AB01A, E-13AL03A, E-13AL05A, E-13AL05B, E-13AL07B, E-13AL08, E-13AL09, E-13FC23, E-13FC24, E-13SA23, E-1F9101, E-1F9202, E-1F9203, E-1F9204, M-12AL01, M-12FC02

5.2 PFSSD CABLE EVALUATION

Table A-15-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-15. The applicable evaluation section is also listed in Table A-15-4.

Table A-15-4
PFSSD Cables Located in Fire Area A-15

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ABI21MA	1331	ABPT0524	I	5.2.1	SG B Steamline Pressure Transmitter
11ABI21RA	1331	ABPT0534	I	5.2.1	SG C Steamline Pressure Transmitter
11ABK23AC	1331	ABHY0018A	C	5.2.2	Loop 2 MSIV Bypass Solenoid Valve
11ABK23AD	1331	ABHY0021A	C	5.2.2	Loop 3 MSIV Bypass Solenoid Valve
11ABK28BH	1331	ABHV0020	C	5.2.2	Loop 3 Main Steam Isolation Valve
11ABK29AH	1331	ABHV0017	C	5.2.2	Loop 2 Main Steam Isolation Valve
11AEK16BH	1331	AEFV0041	C	5.2.3	SG C Feedwater Isolation Valve
11AEK17AH	1331	AEFV0040	C	5.2.3	SG B Feedwater Isolation Valve
11ALI03AD	1331	ALHV0009	I	5.1.1	Train A MDAFP Discharge to SG B
11ALI03AE	1331	ALHV0009	I	5.1.1	Train A MDAFP Discharge to SG B
11ALI03AF	1331	ALHV0009	I	5.1.1	Train A MDAFP Discharge to SG B
11ALI03BD	1331	ALHV0011	I	5.1.1	Train A MDAFP Discharge to SG C
11ALI03BE	1331	ALHV0011	I	5.1.1	Train A MDAFP Discharge to SG C
11ALI03BF	1331	ALHV0011	I	5.1.1	Train A MDAFP Discharge to SG C
11ALI05AD	1331	ALHV0006	I	5.1.1	TDAFP Discharge to SG D
11ALI05AE	1331	ALHV0006	I	5.1.1	TDAFP Discharge to SG D
11ALI05AF	1331	ALHV0006	I	5.1.1	TDAFP Discharge to SG D
11ALI05BD	1331	ALHV0008	I	5.1.1	TDAFP Discharge to SG A
11ALI05BE	1331	ALHV0008	I	5.1.1	TDAFP Discharge to SG A
11ALI05BF	1331	ALHV0008	I	5.1.1	TDAFP Discharge to SG A
11ALI08AA	1331	ALPT0037	I	5.1.1	ESFAS AFW Low Suction Press Transmitter
11ALI09BA	1331	ALFT0009	I	5.1.1	Auxiliary Feedwater Flow To SG B
11ALI09CA	1331	ALFT0011	I	5.1.1	Auxiliary Feedwater Flow To SG C

Table A-15-4
PFSSD Cables Located in Fire Area A-15

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BMK06FA	1331	BMHV0002	C	5.2.4	SG B to Blowdown Flash Tank Iso Valve
11BMK06GA	1331	BMHV0003	C	5.2.4	SG C to Blowdown Flash Tank Iso Valve
12ABI20FE	1331	ABPV0002	I	5.2.5	SG B Atmospheric Relief Vlv (ABPY0002)
12ABI21NA	1331	ABPT0525	I	5.2.1	SG B Steamline Pressure Transmitter
12ABI21SA	1331	ABPT0535	I	5.2.1	SG C Steamline Pressure Transmitter
12ABK01AF	1331	ABHV0005	C	5.1.1	Main Steam Loop 2 To TDAFW Pump
12ABK01BF	1331	ABHV0006	C	5.1.1	Main Steam Loop 3 To TDAFW Pump
12ALI07KD	1331	ALPT0026	I	5.1.1	Turbine AUX Feedwater Pump SUCT
12ALI08BA	1331	ALPT0038	I	5.1.1	ESFAS AFW Low Suction Press Transmitter
12FCK23AD	1331	FCHV0312	C	5.1.1	TDAFP Mechanical Trip/Throttle Valve
12FCK23AF	1331	FCHV0312	C	5.1.1	TDAFP Mechanical Trip/Throttle Valve
12FCK23AG	1331	FCHV0312	C	5.1.1	TDAFP Mechanical Trip/Throttle Valve
12FCK23AR	1331	FCHV0312	P	5.1.1	TDAFP Mechanical Trip/Throttle Valve
12FCK23AS	1331	FCHV0312	C	5.1.1	TDAFP Mechanical Trip/Throttle Valve
12FCK23AV	1331	FCHV0312	C	5.1.1	TDAFP Mechanical Trip/Throttle Valve
12FCK23AX	1331	FCHV0312 FCFV0313	C	5.1.1	TDAFP Mechanical Trip/Throttle Valve TDAFP Speed Governing Valve
12FCK24AA	1331	FCFV0313	C	5.1.1	TDAFP Speed Governing Valve
12FCK24AB	1331	FCFV0313	I	5.1.1	TDAFP Speed Governing Valve
12FCK24AK	1331	FCFV0313	I	5.1.1	TDAFP Speed Governing Valve
12FCK24AS	1331	FCFV0313	I	5.1.1	TDAFP Speed Governing Valve
12FCK24AT	1331	FCFV0313	I	5.1.1	TDAFP Speed Governing Valve
12FCK24AV	1331	FCFV0313	I	5.1.1	TDAFP Speed Governing Valve

Table A-15-4
PFSSD Cables Located in Fire Area A-15

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12SAZ23AA	1331	ABHV0005	C	5.1.1	Main Steam Loop 2 To TDAFW Pump
12SAZ23BA	1331	ABHV0006	C	5.1.1	Main Steam Loop 3 To TDAFW Pump
14ABK23FC	1331	ABHY0018B	C	5.2.2	Loop 2 MSIV Bypass Solenoid Valve
14ABK23FD	1331	ABHY0021B	C	5.2.2	Loop 3 MSIV Bypass Solenoid Valve
14ABK28AH	1331	ABHV0017	C	5.2.2	Loop 2 Main Steam Isolation Valve
14ABK29BH	1331	ABHV0020	C	5.2.2	Loop 3 Main Steam Isolation Valve
14AEK16AH	1331	AEFV0040	C	5.2.3	SG B Feedwater Isolation Valve
14AEK17BH	1331	AEFV0041	C	5.2.3	SG C Feedwater Isolation Valve
14ALI05AG	1331	ALHV0010	I	5.1.1	TDAFP Discharge to SG B
14ALI05AH	1331	ALHV0010	I	5.1.1	TDAFP Discharge to SG B
14ALI05AJ	1331	ALHV0010	I	5.1.1	TDAFP Discharge to SG B
14ALI05BD	1331	ALHV0012	I	5.1.1	TDAFP Discharge to SG C
14ALI05BE	1331	ALHV0012	I	5.1.1	TDAFP Discharge to SG C
14ALI05BF	1331	ALHV0012	I	5.1.1	TDAFP Discharge to SG C
14ALI08CA	1331	ALPT0039	I	5.1.1	ESFAS AFW Low Suction Press Transmitter
14BMK06BA	1331	BMHV0002	C	5.2.4	SG B to Blowdown Flash Tank Iso Valve
14BMK06CA	1331	BMHV0003	C	5.2.4	SG C to Blowdown Flash Tank Iso Valve

5.2.1 Safety Injection and Containment Spray

Calculation XX-E-013, Appendix 1 (PFSSD Support Section) provides a detailed discussion about the potential PFSSD impact of a spurious safety injection signal (SIS) and spurious containment spray actuation signal (CSAS). This section discusses the specific PFSSD impact if a fire occurs in this area.

A spurious CSAS cannot occur if a fire occurs in area A-15.

Cables associated with steam line pressure transmitters ABPT0524, ABPT0525, ABPT0534 and ABPT0535 are run in area A-15. Consequently, the two out of three logic for low steam line pressure initiation of SIS can be satisfied on steam generators B and C if a fire occurs in area A-15.

A spurious SIS starts the charging sequence which starts the CCPs and opens the BIT flowpath valves. For a fire in this area, the BIT flowpath valves are unaffected and would open on a SIS. The RWST valves are unaffected and would open on a SIS. Also, the CCP mini flow valves are unaffected and CCW flow to the seal water heat exchanger is unaffected to ensure cooling of the recirc flow and RCP seal return. CCW flow is available for the CCP oil coolers. Therefore, the charging pumps will not be affected by a spurious SIS caused by a fire in this area.

A start of the credited CCW system (Train B) will not adversely impact the system. The Train B ESW system is unaffected and will start on a spurious SIS, providing necessary cooling water to the CCW heat exchanger.

A start of the AFW pumps will not adversely impact PFSSD. The Train B AFW pump is credited for a fire in this area. Suction from the CST to the Train B AFW pump is unaffected. Discharge flow will either return to the CST or flow to the steam generators through the discharge control valves. Therefore, the Train B AFW pump is unaffected by a spurious SIS caused by a fire in this area.

A start of the RHR pumps due to a spurious SIS will not adversely impact either pump. The RWST supply to the pumps is not affected and the recirculation valves will remain in the open position. Component cooling water is available to both RHR heat exchangers. Operators will have time to terminate the spurious SIS and stop the pumps.

Based on the above discussion, a SIS due to spurious low steam line pressure can occur if a fire occurs in this area. Credited PFSSD equipment will not be damaged by the spurious SIS. Therefore, the spurious SIS will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13AB21, E-13EM01, E-1F9431, E-1F9432, M-12AB01

5.2.2 Steam Generator Main Steam Isolation Valves (MSIVs) and Bypass Valves

PFSSD requires the MSIVs and bypass valves be closed to prevent reactivity addition due to uncontrolled cooldown. The MSIVs and bypass valves are closed from the control room using hand switches ABHS0079 or ABHS0080. The bypass valves are normally closed.

Each MSIV is designed to utilize system fluid (main steam) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main steam. This is done by actuating either all close hand switch ABHS0079 (separation group 4) or ABHS0080 (separation group 1) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MSIV	ABHS0079 (Sep Group 4)		ABHS0080 (Sep Group 1)	
	Solenoids	Cable	Solenoids	Cable
ABHV0011	MV2, MV4, MV6	14ABK28BH	MV1, MV3, MV5	11ABK29BH
ABHV0014	MV2, MV4, MV6	14ABK29AH	MV1, MV3, MV5	11ABK28AH
ABHV0017	MV2, MV4, MV6	14ABK28AH	MV1, MV3, MV5	11ABK29AH
ABHV0020	MV2, MV4, MV6	14ABK29BH	MV1, MV3, MV5	11ABK28BH

Cables 11ABK28BH, 11ABK29AH, 14ABK28AH and 14ABK29BH are run in area A-15. Damage to these cables could prevent closing ABHV0017 and ABHV0020 using either hand switch ABHS0079 or ABHS0080.

Each MSIV bypass valve is normally closed and is required to remain closed for PFSSD. Two (2) redundant solenoid valves (one on each train) are installed on the air supply line and control air to the pneumatic actuator. The valves are normally closed with the solenoid valves de-energized. Actuation of either hand switch will de-energize power to the solenoids to ensure they remain closed.

Cables 11ABK23AC and 11ABK23AD associated with separation group 1 (Train A) solenoids for bypass valves ABHV0018 and ABHV0021 are run in this area. Cables 14ABK23FC and 14ABK23FD associated with separation group 4 (Train B) solenoids for bypass valves ABHV0018 and ABHV0021 are run in this area. An intra-cable hot short, open circuit or short to ground will not energize the solenoids and will maintain the valves in their normally closed position. However, a +125 vdc single conductor inter-cable hot short will cause the solenoid valves to energize and open the bypass valves. Although the NRC has indicated in RIS 2004-03, Rev. 1 that this is a very unlikely scenario due to the use of thermoset cables, it is postulated to occur based on Wolf Creek's licensing requirements. Therefore, the possibility exists for MSIV bypass valves ABHV0018 and ABHV0021 to open.

Based on the above discussion, a fire in area A-15 could prevent operators from closing MSIVs ABHV0017 and ABHV0020 and could cause the spurious opening of MSIV bypass valves ABHV0018 and ABHV0021. If this occurs, operators can isolate redundant components located downstream of the MSIVs using hand switches in the main control room. These include the steam dumps, the main steam drain valves, main feed pump turbine valves and others as indicated on E-1F9103. Cables associated with these components are not located in area A-15.

References: E-15000, XX-E-013, E-13AB23A, E-13AB23B, E-13AB26, E-13AB27, E-13AB28, E-13AB29, E-1F9101, E-1F9103, M-12AB02, M-628-00049

5.2.3 Steam Generator Main Feedwater Isolation Valves

PFSSD requires that either the main feedwater isolation valves (MFIVs) be closed or the main feedwater pumps be stopped to prevent overfilling the steam generators. Flow diversion from auxiliary feedwater (AFW) to the main feedwater system piping is prevented by check valves AEV0420, AEV0421, AEV0422 and AEV0423. Closure of the main feedwater isolation valves is not required to prevent AFW flow diversion.

Each MFIV is designed to utilize system fluid (feedwater) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main feedwater. This is done by actuating either all close hand switch AEHS0080

(separation group 1) or AEHS0081 (separation group 4) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MFIV	AEHS0080 (Sep Group 1)		AEHS0081 (Sep Group 4)	
	Solenoids	Cable	Solenoids	Cable
AEFV0039	MV1, MV3, MV5	11AEK16AH	MV2, MV4, MV6	14AEK17AH
AEFV0040	MV1, MV3, MV5	11AEK17AH	MV2, MV4, MV6	14AEK16AH
AEFV0041	MV1, MV3, MV5	11AEK16BH	MV2, MV4, MV6	14AEK17BH
AEFV0042	MV1, MV3, MV5	11AEK17BH	MV2, MV4, MV6	14AEK16BH

Cables 11AEK16BH, 11AEK17AH, 14AEK16AH and 14AEK17BH are run in area A-15. Cable damage due to a fire could prevent closing AEFV0040 and AEFV0041 using either hand switch AEHS0080 or AEHS0081.

As discussed in Section 5.2.2, the MSIVs may not close due to a fire in this area but the downstream MSIV components are unaffected. The steam driven main feedwater pumps and the motor driven feedwater pump can be stopped from the control room.

Based on the above discussion, steam generator overfilling can be prevented by stopping all three main feedwater pumps from the control room.

References: E-15000, XX-E-013, E-13AE14, E-13AE15, E-13AE16, E-13AE17, E-1F9201, M-12AE02

5.2.4 Steam Generator Blowdown to Blowdown Flash Tank Valves

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown. The air operated valves are normally open and each valve is controlled by three solenoid valves. All three solenoid valves are required to be energized to open the valve. If any one solenoid is de-energized, the associated valve will close or remain closed. Only two of the three solenoids for each valve are considered in the PFSSD analysis, so the third solenoid is assumed energized throughout the event.

Cables 11BMK06FA, 11BMK06GA, 14BMK06BA and 14BMK06CA are run in area A-15. An open circuit within cables 11BMK06FA and 11BMK06GA will prevent closing BMHV0002 and BMHV0003 from the Radwaste Control Room panel BM157. A hot short within cables 14BMK06BA and 14BMK06CA will not cause valves BMHV0002 and BMHV0003 to spuriously open due to the absence of a +125 VDC source conductor. However, the cables are run in raceway that could contain other cables carrying 125 VDC that, if an inter-cable hot short occurs, could spuriously open the valves and prevent them from being closed using hand switches BMHIS0002A and BMHIS0003A in the main control room. Although this is unlikely due to the use of thermoset cables, it is postulated to occur due to Wolf Creeks licensing basis.

Based on the above discussion, it may not be possible to close BMHV0002 and BMHV0003 using hand switches in the main control room and the radwaste control room. In the unlikely event that cable damage described above occurs, all four blowdown valves can be failed closed by opening breaker NK4411 in room 3404 (fire area C-15). Access to this room is available without having to pass through area A-15 and emergency lighting is available.

Thermal hydraulic analysis WCNOC-CP-002 shows insignificant impact on SG inventory even with all four blowdown valves open. Therefore, no E-1F9900 OMA is required to close blowdown valves to achieve and maintain hot standby. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 34.

References: E-15000, XX-E-013, E-13BM06A, E-13BM06C, E-13BM06D, E-1F9101, M-12BM01

5.2.5 Steam Generator Atmospheric Relief Valves

Cables associated with steam generator atmospheric relief valve (ARV) ABPV0002 are run in area A-15. The effects of damage to these cables is discussed in the following paragraphs.

Cable 12ABI20FE provides a signal from ARV ABPV0002 controller to pressure transducer ABPY0002. The transducer signals the position controller (ABZC0002) on ABPV0002 to open whenever steamline pressure reaches a designated setpoint. Damage to the cable due to a fire could cause a spurious signal which could open the ARV and could prevent manual operation of the valve from the control room.

If ARV ABPV0002 cannot be isolated from the main control room, operators can isolate it using local controller ABFHC0002 in area A-23. Area A-23 is accessible and emergency lighting is provided.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB20A, E-13AB20B, E-1F9101, M-12AB01

FIRE AREA A-16

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-16 is located on the 2026 elevation of the Auxiliary Building and includes the rooms listed in Table A-16-1.

Table A-16-1
Rooms Located in Fire Area A-16

ROOM #	DESCRIPTION
1401	CCW pump and heat exchanger area (B)
1402	Corridor (No.1)
1406	CCW pump and heat exchanger area (A)
1408	Corridor (No. 2)

Fire area A-16 is divided into two sections. The North section (A-16 North) starts from approximately 2'-0" South of column line A7 and ends at the North wall at column line A1. The South section (A-16 South) starts at column line A14 and runs North to approximately 2'-0" South of column line A8. Area A-16 South also includes room 1402.

The area between A-16 North and A-16 South is a minimum of 20'-0" in width and is considered an area free of combustibles and fire hazards in accordance with 10CFR50, Appendix R Section III.G.2.b, which states:

> *b. Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the area.*

The 20'-0" wide combustible/fire hazard free zone extends from the East wall of fire area A-9 to the West containment wall. This area shall be maintained free of combustibles and fire hazards at all times, except as approved in the fire hazard analysis.

The separation criteria of 10CFR50, Appendix R Section III.G.2.b, as stated above, is utilized for a number of redundant PFSSD components and cables located in fire area A-16. Intervening combustibles between redundant PFSSD components and cables are limited to cables in sheet metal enclosed cable trays. Fire stops are installed within the cable trays to prevent the spread of fire between redundant PFSSD components and cables. Sheet metal covers will prevent direct flame impingement onto the cables to reduce the likelihood that these cables will become involved in an exposure fire.

The automatic pre-action sprinkler system installed in the area meets the intent of 10CFR50, Appendix R Section III.G.2.b. This system is installed over cable concentrations as described in the Wolf Creek Fire Hazards Analysis. In some areas, sprinklers are installed under the cable trays to protect against exposure fires originating at the floor. Automatic detection is installed throughout the area.

The fire protection features provided in fire area A-16 along with the 20-foot combustible and fire hazard free zone provides reasonable assurance that a fire originating in one section will not affect PFSSD cables and components in the other section.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-16-2 lists each system credited for post-fire safe shutdown in fire area A-16 North and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. Table A-16-3 lists each system credited for post-fire safe shutdown in fire area A-16 South and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-16-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-16 North

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Steam generators B and C ARVs may need to be controlled using the local controllers. Steam generator D ARV may need to be closed by isolating the air and nitrogen supplies. Steam generator A ARV is unaffected. Hand switch ABHS0080 is available to close the MSIVs and MSIV bypass valves. Main steam to TDAFP valves ABHV0005 and ABHV0006 could be affected. PFSSD is assured using Train A MDAFP as discussed in AL system comments below. Steam generator pressure indication is available using ABPI0514A, ABPI0524A, ABPI0534A and ABPI0544A.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
AE	Main Feedwater	H, P	All PFSSD functions associated with the main feedwater system are satisfied. A number of level indicators on all four steam generators could be affected. Level indication is available using the folowing indicators: SG A: AELI0501, AELI0517, AELI0551; SG B: AELI0527, AELI0529; SG C: AELI0537, AELI0539; SG D: AELI0504, AELI0547, AELI0554. All four main feedwater isolation valves can be isolated using hand switch AEHS0080.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. Train A MDAFP is available to supply S/Gs B and C. The Train B MDAFP and the TDAFP could be affected. ALFT0009 and ALFT0011 are available to provide auxiliary feedwater flow indication from MDAFP A to SGs B and C, respectively. Circuits for two of three transmitters that monitor auxiliary feedwater suction pressure run in area A-16 North. Damage to these circuits could send a spurious low suction pressure (LSP) signal to the ESFAS and cause a spurious swapover to ESW. This is acceptable for PFSSD since the Train A ESW system is available.
AP	Condensate Storage System	H	The condensate storage tank is available to supply water to Train A MDAFP.

Table A-16-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-16 North

System	System Name	PFSSD Function*	Comments
BB	Reactor Coolant System	R, M, H, P, S	All PFSSD functions associated with the reactor coolant system are satisfied. Boration through all four RCP seals is unaffected. Loss of inventory through the head vent valves is prevented by maintaining valves BBHV8001A and BBHV8001B closed. Pressurizer level indication is available using BBLI0459A. RCS wide range hot leg temperature element BBTE0423A (Steam Generator B) and wide range cold leg temperature element BBTE0433B (Steam Generator C) are available. RCS pressure indication is available using BBPI0405 or BBPI0406. When transferring to RHR, valve BBPV8702B may need to be manually opened to provide a suction source from the RCS to RHR pump B. A spurious SIS due to low pressurizer pressure on two out of four pressurizer pressure transmitters is mitigated by entering EMG E-0 and terminating the spurious SIS. Pressurizer pressure indication is available using BBPI0455A and BBPI0458.
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. Train A CCP may be affected. Train B Centrifugal Charging Pump (CCP) is available to provide charging flow from the RWST to the RCP seals. Flow from the VCT can be isolated by closing BGLCV0112B. Valves BGHV8154A and BGHV8153B are maintained closed to isolate excess letdown. BGHV8105 may not respond to a close signal from the control room. Valve BGHV8106, and its hand switch (BGHIS8106), are unaffected by a fire in area A-16.
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blowdown system are satisfied. Steam generator blowdown is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C, located on the BM157 panel in the radwaste control room.
BN	Borated Refueling Water Storage System	R, M, H	The RWST is available to provide a suction source to Centrifugal Charging Pump B via valve BNLCV0112E. RWST level indicators BNLI0930, BNLI0931, BNLI0932 and BNLI0933 are available. When initiating RHR, flow from the RWST to RHR pump B can be isolated using BNHV8812B.

Table A-16-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-16 North

System	System Name	PFSSD Function*	Comments
EF	Essential Service Water System	H, S	All PFSSD functions associated with the Essential Service Water (ESW) system are satisfied. Train A ESW is available to supply cooling water to Auxiliary Feedwater Pump room cooler SGF02A and Containment Air Coolers SGN01A and SGN01C. In addition, the Train A ESW system is available to provide a source of auxiliary feedwater to the Train A MDAFP. Train B ESW is available to supply cooling to the Train B Component Cooling Water (CCW) Heat Exchanger, CCW B pump room cooler SGL11B, CCP B room cooler SGL12B, RHR B room cooler SGL10B, and Containment Air Coolers SGN01B and SGN01D.
EG	Component Cooling Water System	S	All PFSSD functions associated with the Component Cooling Water (CCW) system are satisfied. A number of Train A CCW components could be affected. If Train A CCW is operating, it may be necessary to swap to Train B. Train B CCW is unaffected. Temperature control valve EGTV0030 may not close as desired for PFSSD. However, this valve is designed to modulate based on CCW outlet temperature, which is acceptable for PFSSD. Valve EGHV0062 could spuriously close due to a spurious high CCW flow condition caused by damage to EGFT0062. Bypass valve EGHV0132 is unaffected and can be opened using EGHIS0132 to restore thermal barrier cooling. CCW to RCP flow indicator EGFI0129 could be affected. CCW to RCP flow indicator EGFI0128 is unaffected. Valve EGHV0101 could be affected. Valve EGHV0102 is unaffected.
EJ	Residual Heat Removal System	M, H, P	All PFSSD functions associated with the Residual Heat Removal (RHR) system are satisfied. Loss of RCS inventory through the RHR flow path is prevented by maintaining valves EJHV8701A and EJHV8701B closed. RHR Train B is available via RCS suction valve EJHV8701B and discharge valves EJHCV0607 and EJHV8809B. RHR system flow diagnostic instrumentation is available using various available temperature indicators.
EM	High Pressure Coolant Injection	R, M	All PFSSD functions associated with the High Pressure Coolant Injection system are satisfied. A spurious SIS can be mitigated by entering EMG E-0 and terminating the spurious SIS.
EN	Containment Spray	R, M	All PFSSD functions associated with the Containment Spray system are satisfied. A spurious containment spray actuation signal (CSAS) due to spurious signals on two out of four containment pressure transmitters can be terminated by placing pump control hand switches ENHIS0003 and ENHIS0009 on control room panel RL017 in pull-to-lock.
EP	Safety Injection Accumulators	H	The PFSSD Decay Heat Removal function associated with the Safety Injection Accumulators is satisfied. Accumulator injection lines can be isolated by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D.

Table A-16-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-16 North

System	System Name	PFSSD Function*	Comments
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
FC	Auxiliary Turbines	R, H, P	All PFSSD functions associated with the Auxiliary Turbines are satisfied. The Turbine Driven Auxiliary Feedwater Pump is not used for a fire in area A-16 North
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
GF	AFW Pump Room Coolers	S	The PFSSD Support function associated with the AFW Pump Room Coolers is satisfied. The Train A Motor Driven AFW Pump is used for a fire in area A-16 North. Auxiliary Feedwater Pump A room cooler SGF02A is available. ESW Train A is available to supply the room cooler.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD Support function associated with the Control Room and Class 1E Switchgear Room Coolers is satisfied. The control room A/C units SGK04A and SGK04B are not affected by a fire in area A-16. Both trains of Class 1E Switchgear Room Coolers are required for PFSSD. SGK05A is unaffected by a fire in area A-16 North. SGK05B could be affected due to a spurious fire protection system isolation signal. A spurious fire isolation signal can be bypassed by placing GKHS0104 on panel RP068 in BYPASS then rotate switch GKHIS0103 to the RUN position.
GL	Auxiliary Building HVAC	S	The PFSSD Support function associated with the Auxiliary Building HVAC system is satisfied. Train B CCW pump room cooler SGL11B is available.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
GN	Containment Coolers	S	The PFSSD Support function associated with the Containment Coolers is satisfied. Train A (SGN01A and SGN01C) Containment Coolers are available. ESW Train A is available to supply cooling water to the Train A containment coolers. A spurious containment spray actuation signal (CSAS) due to spurious signals on two out of four containment pressure transmitters can be avoided by entering the EMG procedure network and, if necessary, placing the pump control hand switches ENHIS0003 and ENHIS0009 on control room panel RL017 in pull-to-lock. A spurious SIS due to low containment pressure on two out of three containment pressure transmitters is averted by entering the EMG procedure network and, if necessary, placing EMHIS0004 and EMHIS0005 in pull-to-lock. Containment pressure indicators GNPI0934 and GNPI0937 are available.
JE	Diesel Fuel Oil	S	Diesel fuel oil transfer pump PJE01B could be affected.

Table A-16-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-16 North

System	System Name	PFSSD Function*	Comments
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
KJ	Standby Diesel Engine	S	Diesel fuel oil transfer pump PJE01B could be affected, preventing operation of the Train B EDG.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
NB	4.16 kV System	S	The PFSSD Support function associated with the 4.16 kV system is satisfied. Offsite power is unaffected to NB01 and NB02.
NE	Standby Diesel Generator	S	Diesel fuel oil transfer pump PJE01B could be affected, preventing operation of the Train B EDG.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.

Table A-16-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-16 North

System	System Name	PFSSD Function*	Comments
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
RP	Miscellaneous Control Panels	R, M, H, P, S	Several miscellaneous control panel functions are affected by a fire in area A-16 North. Redundant capability exists in a separate area and is unaffected by a fire in area A-16 North.
SA	ESFAS	S	ESFAS input to valves ABHV0005 and ABHV0006 may be affected. These valves are associated with the TDAFP which is not used for a fire in area A-16 North.
SB	Reactor Protection System	R, S	Several circuits associated with the Reactor Protection System are affected by a fire in area A-16 North. Redundant capability exists in a separate area and is unaffected by the fire.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
SE	Ex-Core Neutron Monitoring	R, P	Source Range monitor SENY0061A/B is available.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 North.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

Table A-16-3
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-16 South

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	All PFSSD functions associated with the main steam system are satisfied. Hand switch ABHS0080 is available to close the MSIVs and MSIV bypass valves. All three steam generator pressure indicators on all four steam generators are available.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
AE	Main Feedwater	H, P	All PFSSD functions associated with the main feedwater system are satisfied. A number of level indicators on all four steam generators could be affected. Level indication is available using the following indicators: SG A: AELI0501, AELI0518, AELI0551; SG B: AELI0502, AELI0528, AELI0529, AELI0552; SG C: AELI0503, AELI0538, AELI0539, AELI0553; SG D: AELI0548, AELI0554.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
BB	Reactor Coolant System	R, M, H, P, S	All PFSSD functions associated with the reactor coolant system are satisfied. Boration through all four RCP seals is unaffected. Loss of inventory through the head vent valves is prevented by maintaining valves BBHV8001A and BBHV8001B closed. Pressurizer level indication is available using BBLI0459A. RCS wide range hot leg temperature element BBTE0423A (Steam Generator B) and wide range cold leg temperature element BBTE0433B (Steam Generator C) are available. RCS pressure indication is available using BBPI0405. Pressurizer pressure indication is available using BBPI0455A and BBPI0457. When transferring to RHR, valve BBPV8702A may need to be manually opened to provide a suction source from the RCS to RHR pump A. A spurious SIS due to low pressurizer pressure on two out of four pressurizer pressure transmitters is mitigated by entering EMG E-0 and terminating the spurious SIS. Pressurizer PORV BBPCV0456A may open and block valve BBHV8000B may not close. The PORV can be closed using BBHIS0456A in the control room.

Table A-16-3
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-16 South

System	System Name	PFSSD Function*	Comments
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. Train A Centrifugal Charging Pump (CCP) is available to provide charging flow from the RWST to the RCP seals. Flow from the VCT can be isolated by closing either BGLCV0112B or BGLCV0112C. Valves BGHV8154A and BGHV8153B are maintained closed to isolate excess letdown. Valve BGHV8112 may need to be isolated to prevent overheating the CCP. This may be necessary due to the potential for EGHV0053 to remain closed if swapping from Train B CCW to Train A CCW. RCP seal flow indication is available using BGFI0215A. RCP seal flow indicator BGFI0215B may be affected.
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blowdown system are satisfied. Steam generator blowdown is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C, located on the BM157 panel in the radwaste control room.
BN	Borated Refueling Water Storage System	R, M, H	The RWST is available to provide a suction source to Centrifugal Charging Pump A via valve BNLCV0112D. RWST level indicators BNLI0930, BNLI0931 and BNLI0932 are available. When initiating RHR, flow from the RWST to the RHR pumps can be isolated by closing BNHV8812A and BNHV8812B from the control room.
EF	Essential Service Water System	H, S	All PFSSD functions associated with the Essential Service Water (ESW) system are satisfied. Train A ESW is available to supply cooling water to Auxiliary Feedwater Pump room cooler SGF02A, Containment Air Coolers SGN01A and SGN01C, Train A Component Cooling Water (CCW) Heat Exchanger, CCW A pump room cooler SGL11A, CCP A room cooler SGL12A and RHR A room cooler SGL10A.
EG	Component Cooling Water System	S	All PFSSD functions associated with the Component Cooling Water (CCW) system are satisfied. A number of Train B CCW components could be affected. If Train B CCW is operating, it may be necessary to swap to Train A. Train A CCW flow to service loop valve EGHV0053 may be affected. If the valve was closed at the time of the fire, it may not open using the control room hand switch. If this occurs operators should follow OFN EG-004 and maintain minimum flow through the RCP seals. In addition, operators should close seal return containment isolation valve BGHV8112 to prevent overheating the Train A CCP. Thermal barrier cooling could be lost due to the potential failure of EGHV0053 to open and the potential loss of Train B CCW. Also, valve EGHV0062 could spuriously close. No actions are necessary as long as RCP seal injection is available. CCW to RCP flow indicators EGFI0128 and EGFI0129 are available to diagnose a loss of CCW flow to the RCP thermal barriers. Valve EGHV0102 could be affected. Valve EGHV0101 is unaffected.

Table A-16-3
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-16 South

System	System Name	PFSSD Function*	Comments
EJ	Residual Heat Removal System	M, H, P	All PFSSD functions associated with the Residual Heat Removal (RHR) system are satisfied. Valve EJHV8811B could spuriously open. Valve BNHV8812B can be closed from the control room using BNHIS8812B. Loss of RCS inventory through the RHR flow path is prevented by maintaining valves EJHV8701A and EJHV8701B closed. RHR Train A is available via RCS suction valve EJHV8701A and discharge valves EJHCV0606 and EJHV8809A. Valve EJHV8840 could spuriously open. This will not affect hot standby but the valve will need to be closed prior to shutdown cooling. Both RHR pump mini-flow valves EJFCV0610 and EJFCV0611 are available. RHR system flow diagnostic instrumentation is available using various available temperature indicators.
EM	High Pressure Coolant Injection	R, M	All PFSSD functions associated with the High Pressure Coolant Injection system are satisfied. A spurious SIS is mitigated by entering EMG E-0 and terminating the spurious SIS.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
EP	Safety Injection Accumulators	H	The PFSSD Decay Heat Removal function associated with the Safety Injection Accumulators is satisfied. Accumulator injection lines can be isolated by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. It may be necessary to make a containment entry to manually close EPHV8808B and EPHV8808D.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
FC	Auxiliary Turbines	R, H, P	All PFSSD functions associated with the Auxiliary Turbines are satisfied. The Turbine Driven Auxiliary Feedwater Pump (TDAFP) is not used for a fire in area A-16 South. Valve FCHV0312 will remain closed to prevent uncontrolled steam release through the TDAFP.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
GF	AFW Pump Room Coolers	S	The PFSSD Support function associated with the AFW Pump Room Coolers is satisfied. The Train A Motor Driven AFW Pump is used for a fire in area A-16 South. Auxiliary Feedwater Pump A room cooler SGF02A is available. ESW Train A is available to supply the room cooler.

Table A-16-3
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-16 South

System	System Name	PFSSD Function*	Comments
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD Support function associated with the Control Room and Class 1E Switchgear Room Coolers is satisfied. The control room A/C units SGK04A and SGK04B are not affected by a fire in area A-16. Train A Class 1E Switchgear Room Cooler SGK05A is unaffected by a fire in area A-16 South. Train B Class 1E equipment is not used for a fire in area A-16 South.
GL	Auxiliary Building HVAC	S	The PFSSD Support function associated with the Auxiliary Building HVAC system is satisfied. Train A CCW pump room cooler SGL11A is available.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
GN	Containment Coolers	S	The PFSSD Support function associated with the Containment Coolers is satisfied. Train A (SGN01A and SGN01C) Containment Coolers are available. ESW Train A is available to supply cooling water to the containment coolers. Containment pressure indicators GNPI0934, GNPI0935 and GNPI0937 are available.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
NB	4.16 kV System	S	The PFSSD Support function associated with the 4.16 kV system is satisfied. Offsite and onsite power is available to NB01. Offsite power to bus NB02 could be lost. A fire in A-16 South uses Train A equipment which is fed from NB01. Therefore, loss of NB02 will not affect PFSSD. If necessary, the Train B Emergency Diesel Generator can supply power to NB02.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.

Table A-16-3
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-16 South

System	System Name	PFSSD Function*	Comments
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
NG	480V Load Centers and MCCs	S	Train A 480 VAC MCC NG01B is unaffected by a fire in area A-16 South.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
PA	13.8kV	S	Breakers PA0105 and PA0206 could be affected.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
PN	120VAC	S	One of the two redundant power feeds to PN08 could be affected. The remaining power feed is unaffected. Therefore, PN08 is available to perform its intended function.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD functions associated with panel RP210 is affected by a fire in area A-16 South. Redundant capability exists in a separate area and is unaffected by the fire.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.

Table A-16-3 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-16 South			
System	**System Name**	**PFSSD Function***	**Comments**
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
SE	Ex-Core Neutron Monitoring	R, P	Source Range monitors SENE0031, SENY0060A/B, or SENY0061A/B are available.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-16 South.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-16. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are generally described in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs (OMA, refer to E-1F9900)

If a fire occurs in area A-16 North, it may be necessary to fail close ABPV0004 by isolating the air and nitrogen supply, then venting air from the regulators. Local control stations ABFHC0002 and ABFHC0003, located in fire area A-23, can be used to control ARVs ABPV0002 and ABPV0003, respectively. These actions can be performed by a single operator in fire area A-23, which is accessible without having to traverse area A-16.

3.1.2 Steam Generator to SG Blowdown Flash Tank Isolation

If a fire occurs in area A-16 North or South, cables for BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A may be damaged by the fire. Therefore, use BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C located on the BM157 panel in the Radwaste Control room to close valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Component Cooling Water

A fire in area A-16 North will damage cables and components associated with Train A CCW. If Train A CCW is operating at the time of the fire, it may be necessary to swap to Train B CCW using normal operating procedures.

A fire in area A-16 South will damage cables and components associated with Train B CCW. If Train B CCW is operating at the time of the fire, it may be necessary to swap to Train A CCW using normal operating procedures. However, valve EGHV0053 may not open, preventing CCW flow to the RCP thermal barriers and the seal water heat exchanger. See 3.2.8 and 3.2.9 for actions in the event EGHV0053 cannot be opened.

3.2.2 Containment Spray and Safety Injection

If a fire occurs in area A-16 North or South, a spurious Safety Injection Signal (SIS) could occur. This can be mitigated by consulting EMG E-0 and terminating the spurious SIS.

If a fire occurs in area A-16 North, a spurious Containment Spray Actuation Signal (CSAS) could occur. This can be mitigated by placing CS pump control hand switches ENHIS0003 and ENHIS0009 in pull-to-lock. These switches are located on control room panel RL017.

3.2.3 Mitigation of RWST Draindown to Containment Sump

If a fire occurs in area A-16 South it may be necessary to close valve BNHV8812B from the control room using BNHIS8812B to mitigate draindown of the RWST into the containment sump. This condition could occur due to cable damage to EJHV8811B that causes the valve to partially open and stall before reaching full open position, preventing valve BNHV8812B from automatically closing as designed. Level indicators BNLI0930, BNLI0931 and BNLI0932 are available to diagnose loss of inventory from the RWST.

3.2.4 Main Steam Isolation Valves (MSIVs) and MSIV Bypass Valves

If a fire occurs in area A-16 North or South, cables for hand switch ABHS0079 may be damaged by the fire. Cables for redundant hand switch ABHS0080 are unaffected. Use ABHS0080 to close the MSIVs and MSIV bypass valves.

3.2.5 Charging Pumps to Regenerative Heat Exchanger Isolation

Valve BGHV8105 may not function due to a fire in the North section. Valve BGHV8106, and its hand switch (BGHIS8106), are unaffected by a fire in area A-16 and can be used to isolate flow to the regenerative heat exchanger and therefore satisfy the PFSSD requirement.

3.2.6 Main Feedwater Isolation Valves (MFIVs)

If a fire occurs in area A-16 North, cables for hand switch AEHS0081 may be damaged. Cables for redundant hand switch AEHS0080 are unaffected. Use AEHS0080 to close the MFIVs.

3.2.7 Class 1E Switchgear Room Cooler SGK05B

If a fire occurs in area A-16 North, SGK05B may not respond to an automatic start signal or may shut down due to a fire isolation signal. If this occurs, the spurious fire isolation signal can be bypassed by placing GKHS0104 on panel RP068 in BYPASS and SGK05B can be started by rotating switch GKHIS0103 to the RUN position. Indication for SGK05B is available on the back panel in the CR.

3.2.8 Seal Water Return Flow

If the fire is in A-16 South and Train B CCW is operating at the time of the fire, it may be necessary to swap to Train A CCW. In this case, valve EGHV0053 may not open. Operators should maintain 32 gpm flow to the RCP seals and isolate seal return containment isolation valve BGHV8112 using BGHIS8112 per OFN EG-004. (See Section 5.1.14)

3.2.9 Thermal Barrier Cooling

If the fire is in A-16 North, valve EGHV0062 could spuriously close due to a spurious high CCW flow condition caused by damage to EGFT0062. Bypass valve EGHV0132 is unaffected and can be opened using EGHIS0132 to restore thermal barrier cooling. CCW to RCP flow indicator EGFI0128 is available to diagnose a loss of CCW flow to the RCP thermal barriers.

A fire in A-16 South could result in a loss of thermal barrier cooling due to the potential failure of EGHV0053 to open or spurious closure of EGHV0062. If this occurs, maintain RCP seal injection using Train A charging system. Valve EGHV0062 bypass valve EGHV0132 can be opened from the control room. CCW to RCP flow indicators EGFI0128 and EGFI0129 are available to diagnose a loss of CCW flow to the RCP thermal barriers.

3.2.10 Pressurizer PORV/Block Valve

If the fire is in A-16 South, pressurizer PORV BBPCV0456A could spuriously open due to control cable damage and block valve BBHV8000B may not close. If this occurs, Operators can close the PORV by placing BBHIS0456A in the CLOSE position. Pressurizer pressure indication is available using BBPI0455A and BBPI0457 located on RL002.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR

If either valve BBPV8702A (fire in A-16 South) or BBPV8702B (fire in A-16 North) fails to respond when initiating RHR for cold shutdown, make a containment entry to manually open the valve or perform a cold shutdown repair to fix the damaged circuit.

Valve EJHV8840 could spuriously open in the event of a fire in area A-16 South. This will not affect hot standby, however the valve will need to be locally closed prior to entering shutdown cooling mode.

3.3.2 SI Accumulators

A fire in area A-16 South may require a containment entry to close SI Accumulator injection valves EPHV8808B and EPHV8808D if these valves are unresponsive from the control room.

4.0 CONCLUSION

With some exceptions, redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-16.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-16

PFSSD components (S. in E-15000) located in fire area A-16 are shown in Table A-16-4. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-16-4.

Table A-16-4
PFSSD Components Located in Fire Area A-16

Room #	PFSSD Component	Component Description	Evaluation Section	Comments
1401	DPEG01B	CCW Pump B (PEG01B) Motor	5.1.1	
1401	DPEG01D	CCW Pump D (PEG01D) Motor	5.1.1	
1401	DSGL11B	PEG01B and PEG01D Room Cooler Motor	5.1.2	
1401	EEG01B	Train B CCW Heat Exchanger	5.1.3	
1401	EFHV0052	ESW B to CCW B Heat Exchanger Supply Isolation Valve	5.1.4	
1401	EFHV0060	CCW B Heat Exchanger to ESW B Return Isolation Valve	5.1.4	
1401	EFV0090	CCW B Heat Exchanger to ESW B Return Bypass Isolation Valve	5.1.4	Valve is throttled for proper SI flow and locked in position.
1401	EGHV0054	Train B CCW to Nuclear Auxiliary Components	5.1.14	
1401	EGPT0078	CCW Pump B and D Discharge Header Pressure Transmitter	5.1.5	
1401	EGTV0030	CCW B Heat Exchanger Bypass Isolation Valve	5.1.6	
1401	EGTY0030A	CCW B Heat Exchanger Bypass Isolation Valve Solenoid	5.1.6	
1401	GLHIS0023	DSGL11B Local Hand Switch	5.1.2	
1402	EGHV0102	CCW B to RHR B Heat Exchanger Control Valve	5.1.8	
1402	EGHV0016	CCW B Pumps Common Header Return Isolation Valve	5.1.9	
1402	EGHV0053	Train A CCW to Nuclear Auxiliary Components	5.1.14	
1402	RP210	Auxiliary Relay Rack	5.1.10	
1402	TB14109	Fire Cable Termination Box for EGHV0016 and EGHV0054	5.1.9 5.1.14	
1406	DPEG01A	CCW Pump A (PEG01A) Motor	5.1.1	
1406	DPEG01C	CCW Pump C (PEG01C) Motor	5.1.1	

Table A-16-4
PFSSD Components Located in Fire Area A-16

Room #	PFSSD Component	Component Description	Evaluation Section	Comments
1406	DSGL11A	PEG01A and PEG01C Room Cooler Motor	5.1.2	
1406	EEG01A	Train A CCW Heat Exchanger	5.1.3	
1406	EFHV0051	ESW A to CCW A Heat Exchanger Supply Isolation Valve	5.1.4	
1406	EFHV0059	CCW A Heat Exchanger to ESW A Return Isolation Valve	5.1.4	
1406	EFV0058	CCW A Heat Exchanger to ESW A Return Bypass Isolation Valve	5.1.4	Valve is throttled for proper SI flow and locked in position.
1406	EGPT0077	CCW Pump A and C Discharge Header Pressure Transmitter	5.1.5	
1406	EGTV0029	CCW A Heat Exchanger Bypass Isolation Valve	5.1.6	
1406	EGTY0029A	CCW A Heat Exchanger Bypass Isolation Valve Solenoid	5.1.6	
1406	GLHIS0002	DSGL11A Local Hand Switch	5.1.2	
1406	GLHZ0080	CCW A Pump Room Cooler Exhaust Damper	5.1.2	
1406	GLHZ0081	CCW A Pump Room Cooler Exhaust Damper	5.1.2	
1408	BB008	DC Contactor Panel for PORV BBPCV0456A	5.1.7	
1408	EGHV0101	CCW A to RHR A Heat Exchanger Control Valve	5.1.8	
1408	EGHV0015	CCW A Pumps Common Header Return Isolation Valve	5.1.9	
1408	RP266	Auxiliary Relay Rack	5.1.11	
1408	RP331	Auxiliary Relay Rack	5.1.6 5.1.12	
1408	RP333	Auxiliary Relay Rack	5.1.13	

5.1.1 Component Cooling Water Pumps

For PFSSD, the component cooling water (CCW) system is used to provide cooling to the centrifugal charging pump (CCP) oil cooler, seal water heat exchanger, RHR heat exchangers and RHR pump seal coolers. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

The component cooling water pumps support the above PFSSD function by providing the motive force necessary to circulate cooling water to these PFSSD credited components. All four component cooling water pumps are located in this fire area. Train A pumps PEG01A and PEG01C are located in area A-16 North and Train B pumps PEG01B and PEG01D are located in area A-16 South.

Cables 11EGB01AA and 11EGB01CA are power cables for Train A CCW pump motors DPEG01A and DPEG01C, respectively, and are run in fire area A-16 North. Damage to these cables will result in loss of power to the associated CCW pump.

Cables 14EGB01BA and 14EGB01DA are power cables for Train B CCW pump motors DPEG01B and DPEG01D, respectively, and are run in fire area A-16 South. Damage to these cables will result in loss of power to the associated CCW pump.

If the fire causes a loss of one CCW pump, Operators can use hand switches on RL019 to start another pump on the affected train or swap to the opposite CCW train. Cables associated with CCW pump hand switches do not run through area A-16.

Each CCW Pump can supply 100 percent of the required cooling water to selected Engineered Safety Features (ESF) components. If a fire occurs in area A-16 North, Train B CCW is available using either CCW pump PEG01B or PEG01D. If a fire occurs in area A-16 South, Train A CCW is available using either PEG01A or PEG01C.

Based on the above discussion, at least one train of CCW pumps will be available if a fire occurs in area A-16.

References: E-15000, XX-E-013, E-1F9401A, E-0R1412, E-0R1422, E-1R1411, E-1R1413A, E-1R1413C, E-1R1421, E-1R1423B, E-1R1423C, E-13EG01A, E-13EG01B, E-13EG01C, E-13EG01D, E-13EG13, E-13NB02, E-13NB05, M-12EG01, M-12EG02, M-12EG03

5.1.2 Component Cooling Water Pump Room Cooling

The CCW pump room coolers are required to ensure the CCW pump motors do not exceed temperature limits. DSGL11A is the room cooler motor for Train A CCW pumps PEG01A and PEG01C. GLHIS0002 is a local hand switch for DSGL11A. These components are located in area A-16 North.

DSGL11B is the room cooler motor for the PEG01B and PEG01D (Train B) CCW pumps. GLHIS0023 is a local hand switch for DSGL11B. These components are located in area A-16 South.

Cables 11GLG06AA and 11GLG06AC are run in area A-16 North and are associated with DSGL11A and GLHIS0002, respectively. Redundant cables 14GLG06BA and 14GLG06BC are run in area A-16 South and are associated with DSGL11B and GLHIS0023, respectively.

GLHZ0080 and GLHZ0081 are exhaust dampers on the Train A CCW pump room cooler (SGL11A). There are no exhaust dampers on the Train B CCW pump room cooler. Cables 11GLY27AB and 11GLY27AD are associated with GLHZ0080 and GLHZ0081, respectively and are run in area A-16 North.

There are no dampers installed on the Train B CCW pump room coolers so there are no cables to evaluate.

PFSSD requires that either train room cooler be operable for the associated train CCW pumps. A fire in area A-16 North will affect Train A room cooler SGL11A but Train B room cooler SGL11B will be available. A fire in area A-16 South will affect Train B room cooler SGL11B but Train A room cooler SGL11A will be available. Therefore, CCW pump room cooling is available to the credited train if a fire occurs in this area.

References: E-15000, XX-E-013, E-13GL06, E-13GL27, E-1F9444, E-1R1411, E-1R1413B, E-1R1413C, E-1R1413D, E-1R1421, E-1R1423A, E-1R1423B, E-1R1423C, E-1R1423D, E-1R1431, E-1R1433A, E-1R1433B, M-12GL01, M-12GL02

5.1.3 Component Cooling Water Heat Exchangers

The CCW heat exchangers ensure adequate transfer of heat from plant components to the ultimate heat sink. The heat exchanger on the credited train is required to be available to ensure this function. The heat exchangers themselves are mechanical components and do not rely on electrical input to operate.

Train A CCW heat exchanger EEG01A is located in area A-16 North and Train B CCW heat exchanger EEG01B is located in area A-16 South. A fire is unlikely to damage the heat exchanger but could affect associated train components as discussed throughout this evaluation.

Based on the above evaluation, the CCW heat exchanger on the credited train will be unaffected by a fire in area A-16 North or A-16 South.

References: E-15000, XX-E-013, E-1F9403, M-12EG02

5.1.4 Essential Service Water to Component Cooling Water Valves

EFHV0051 is the Essential Service Water (ESW) Train A to CCW Train A heat exchanger supply isolation valve and is required to be open when using Train A for PFSSD. EFHV0059 is the return isolation valve from CCW Train A heat exchanger to the Ultimate Heat Sink (UHS). PFSSD requires that EFHV0059 be closed when using Train A CCW for plant shutdown following a fire and that valve EFV0058 be maintained in a locked throttled position to provide the minimum required ESW water flow. If valve EFHV0059 were to spuriously open when operating Train A ESW, flow imbalance could occur, which will result in flow depletion and inoperability of essential PFSSD components.

EFHV0052 is the Essential Service Water (ESW) Train B to CCW Train B heat exchanger supply isolation valve and is required to be open when using Train B for PFSSD. EFHV0060 is the return isolation valve from CCW Train B heat exchanger to the Ultimate Heat Sink (UHS). PFSSD requires that EFHV0060 be closed when using Train B CCW for plant shutdown following a fire and that valve EFV0090 be maintained in a locked throttled position to provide the minimum required ESW water flow. If valve EFHV0060 were to spuriously open when operating Train B ESW, flow imbalance could occur, which will result in flow depletion and inoperability of essential PFSSD components.

Cables 11EFG05AA and 11EFG05AB are power and control cables associated with EFHV0051 and are run in area A-16 North. Cables 11EFG04AA and 11EFG04AB are power and control cables associated with EFHV0059 and are run in area A-16 North. A fire in area A-16 North will result in damage to these cables and the inability to control ESW flow to Train A CCW. However, Train B ESW valves are unaffected due to 20 feet of horizontal separation

with no intervening combustibles and suppression and detection. Therefore, Train B ESW will be used if the fire affects the North section.

Cables 14EFG05BA and 14EFG05BB are power and control cables associated with EFHV0052 and are run in area A-16 South. Cables 14EFG04BA and 14EFG04BB are power and control cables associated with EFHV0060 and are run in area A-16 South. A fire in area A-16 South will result in damage to these cables and the inability to control ESW flow to Train B CCW. However, Train A ESW valves are unaffected due to 20 feet of horizontal separation with no intervening combustibles and suppression and detection. Therefore, Train A ESW will be used if the fire affects the South section.

Based on the above discussion, at least one Train of ESW to CCW valves will be available if a fire occurs in area A-16.

References: E-15000, XX-E-013, E-1R1411, E-1R1413C, E-1R1423B, E-1R1423D, E-1R1431, E-1R1433A, E-1R1901, E-13EF04, E-13EF04A, E-13EF05, M-12EF02.

5.1.5 Component Cooling Water Pumps Pressure Transmitters

EGPT0077 is a pressure transmitter that monitors the discharge pressure on the Train A CCW pumps discharge header. EGPT0078 is a pressure transmitter that monitors the discharge pressure on the Train B CCW pumps discharge header. A low discharge pressure will automatically start the standby pump on the associated train. PFSSD requires that the pressure transmitter on the unaffected train be available.

Cable 11EGI13AA is associated with EGPT0077 and is run in area A-16 North. Cable 14EGI13BA is associated with EGPT0078 and is run in area A-16 South. Damage to these cables could cause the associated pressure transmitter to malfunction.

If a fire occurs in area A-16 North, EGPT0078 will be available. If a fire occurs in area A-16 South, EGPT0077 will be available. Therefore, pressure indication for the operating CCW pump will be available in the control room if a fire occurs in area A-16.

References: E-15000, XX-E-013, E-1R1411, E-1R1413B, E-1R1413C, E-1R1413D, E-1R1423A, E-1R1423C, E-1R1423D, E-13EG13, E-13RP07, E-13RP08, E-13RP09, M-12EG01.

5.1.6 Component Cooling Water Heat Exchanger Bypass Isolation Valves

EGTV0029 is the bypass isolation valve for the Train A CCW heat exchanger located in area A-16 North. This valve is air operated using solenoid valve EGTY0029A. With solenoid valve EGTY0029A energized (normal state), valve EGTV0029 is automatically modulated to maintain required CCW heat exchanger outlet temperature. Loss of power to the solenoid will fail valve EGTV0029 closed, which is the desired PFSSD position.

EGTV0030 is the bypass isolation valve for the Train B CCW heat exchanger located in area A-16 South. This valve is air operated using solenoid valve EGTY0030A. With solenoid valve EGTY0030A energized (normal state), valve EGTV0030 is automatically modulated to maintain required CCW heat exchanger outlet temperature. Loss of power to the solenoid will fail valve EGTV0030 closed, which is the desired PFSSD position.

Cable 11EGK16AA is associated with valve EGTV0029 and is run in area A-16 North. Cable 14EGK16BA is associated with valve EGTV0030 and is run in area A-16 South. Damage to either of these cables will either energize or de-energize the associated solenoid valve, causing the valve to modulate as designed or fail closed. Damage to either of these cables will not affect the available CCW train.

Cable 14EGK16BC is associated with the B Train CCW bypass isolation valve EGTV0030, but is run in area A-16 North (Train A side) of fire area A-16. This cable is run to EGTV0030 auxiliary relay 3XEG8 in Auxiliary Relay Rack RP331, which is also located in area A-16 North. Damage to this cable or relay will either de-energize or energize the solenoid valve, causing valve EGTV0030 to close or modulate, respectively.

Valve modulation is controlled mechanically by temperature detectors EGTIC0029 (Train A) and EGTIC0030 (Train B). Each temperature detector is located adjacent to its associated train CCW in either area A-16 North or South. The temperature detectors monitor outlet temperature of the CCW heat exchanger and adjust air pressure to the temperature control valves (EGTV0029 and EGTV0030) accordingly. This controls the amount of water that bypasses the CCW heat exchanger to maintain the outlet temperature at the desired level. Valve modulation will not affect PFSSD.

Based on the above discussion, CCW temperature control is satisfied if a fire occurs in area A-16.

References: E-15000, XX-E-013, M-12EG02, E-13EG16, E-1R1413A, E-1R1423A, E-1R1423B, E-1R1423C, E-1R1423D, E-1R1424, E-1R1443A, E-1R1443B.

5.1.7 Pressurizer Power Operated Relief Valves and Associated Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed. Cables and components associated with PORV BBPCV0456A and associated block valve BBHV8000B are located in area A-16 South.

BB008 is the DC contactor panel for PORV BBPCV0456A located in area A-16 South. Damage to this panel due to a fire in area A-16 South could cause PORV BBPCV0456A to spuriously open. Cables for PORV BBPCV0456A are also run in area A-16 South. Damage to these cables could also cause BBPCV0456A to spuriously open.

Valve BBHV8000B is located in a different fire area, however, cables for BBHV8000B are located in area A-16 South and could be damaged, causing the valve to be unresponsive to a close signal.

The pressurizer PORVs are not considered high/low pressure interfaces. The valves are supplied power by an ungrounded 125 VDC system. Therefore, based on GL 86-10, consideration of multiple proper polarity hot shorts is not required. A single proper polarity hot short still needs to be considered.

In the event a fire causes BBPCV0456A to open and damages BBHV8000B cables, Operators can close BBPCV0456A by placing hand switch BBHIS0456A, located on RL021, in the close position. Pressurizer level and RCS pressure indication are available to diagnose a failed open PORV using BBLI0459A and BBPI0405, respectively. In addition, pressurizer pressure indication is available using BBPI0455A and BBPI0457.

An instrument cable (12BBI16LB) associated with pressurizer pressure transmitter BBPT0456 is run in fire areas A-16 South and A-16 North. An instrument cable (13BBI16MB) associated with pressurizer pressure transmitter BBPT0457 is run in fire area A-16 North. An instrument cable (14BBI16NB) associated with pressurizer pressure transmitter BBPT0458 is run in fire area A-16 South. As discussed in Calculation XX-E-013, Appendix 1, the Ovation pressurizer pressure control system uses 4-channel verification from all four pressurizer pressure transmitters to operate the pressurizer PORVs. Failure of a single channel will not cause the spurious operation of the PORVs since the system uses the 2nd highest input as the validated signal. Damage to two channels will not cause the PORVs to open because both channels

would have to fail to the exact same value at the exact same time and therefore this failure mode is not credible, as discussed in XX-E-013.

Based on the above discussion, a fire in area A-16 North will have no impact on pressurizer PORVs BBPCV0455A and BBPCV0456A. A fire in area A-16 South could cause BBPCV0456A to open due to damage to the PORV control cables. In addition, a fire in area A-16 South could prevent block valve BBHV8000B from closing. The PORV can be closed using hand switch BBHIS0456A in the main control room.

References: E-15000, M-12BB02, E-13BB39, E-13BB40, E-13BB16, M-744-00028, M-761-02018, OFN KC-016, J-200-00207, CR 13079, DCP 12944, DCP 13324.

5.1.8 Component Cooling Water to Residual Heat Removal Heat Exchanger Control Valves

Valve EGHV0101 is the Train A CCW to RHR Heat Exchanger control valve. Valve EGHV0102 is the Train B CCW to RHR Heat Exchanger control valve. PFSSD requires that the valve on the operating train of CCW be closed until shutdown cooling mode is entered, at which time the valve on the operating train of RHR needs to be open.

Valve EGHV0101 is located in area A-16 North in room 1408. Valve EGHV0102 is located in area A-16 South in room 1402.

Cables 11EGG07AA and 11EGG07AB are associated with EGHV0101 and are run in area A-16 North. Consequently, a fire in this area will cause a loss of CCW A cooling to the A Train RHR heat exchanger. Damage to these cables would not cause the spurious opening of the valve. Valve EGHV0102 is unaffected by a fire in area A16 North.

Cables 14EGG07BA and 14EGG07BB are associated with EGHV0102 and are run in area A-16 South. Consequently, a fire in this area will cause a loss of CCW B cooling to the B Train RHR heat exchanger. Damage to these cables would not cause the spurious opening of the valve. Valve EGHV0101 is unaffected by a fire in area A16 South.

Based on the above discussion, a fire in area A-16 North could prevent operation of Train A RHR but Train B RHR is available. A fire in area A-16 South could prevent operation of Train B RHR but Train A RHR is available.

References: E-15000, XX-E-013, M-12EG02, E-1F9401A, E-1R1413B, E-1R1413D, E-1R1423C, E-13EG07

5.1.9 Component Cooling Water Common Header Return Valves

Valve EGHV0015 is the Train A CCW Common Header Return Valve. Valve EGHV0016 is the Train B CCW Common Header Return Valve. PFSSD requires that the valve on the operating CCW Train be open.

Valve EGHV0015 is located in area A-16 North in room 1408. Cables 11EGG05AA and 11EGG05AB are power and control cables, respectively, for EGHV0015 and are run in area A-16 North. Consequently, a fire in area A-16 North could cause a loss of the A Train CCW common header return valve but the B Train CCW common header return valve (EGHV0016) remains available.

Valve EGHV0016 is located in area A-16 South in room 1402. Cables 14EGG05BD, 14EGG05BE, 14EGG05BF and 14EGG05BG, associated with EGHV0016, are run in area A-16 South. These cables run to terminal box TB14109 which is also located in area A-16 South in room 1402. Cables 14EGG05BD and 14EGG05BE are also run in the combustible free zone between areas A-16 South and A-16 North as well as A-16 North. These cables are fire resistive and will not be affected by a postulated exposure fire. Cables 14EGG05BF and

14EGG05BG are not fire resistive and could be damaged by an exposure fire. Consequently, a fire in area A-16 South could cause a loss of the B Train CCW common header return valve but the A Train CCW common header return valve (EGHV0015) remains available.

It may not be possible to isolate one train from the other due to cable damage, but per calculation M-EG-24, the system will continue to operate with no damage to the pumps if the opposite train valve is not closed.

Based on the above discussion, a fire in this area will not adversely impact CCW common header return valve on the credited train.

References: E-15000, XX-E-013, E-13EG05A, E-1F9401A, E-1R1413B, E-1R1413D, E-1R1423C, M-12EG01, Calculation M-EG-24, CP 12418

5.1.10 Auxiliary Relay Rack RP210

RP210 is an Auxiliary Relay Rack located in room 1402. This relay rack houses PFSSD relays 3XBM9, 3XBM10, 3XBM11, 3XBM12 and 94XAB6. Relays 3XBM9, 3XBM10, 3XBM11 and 3XBM12 are associated with the Steam Generator Blowdown to Blowdown Flash Tank Isolation Valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004, respectively. Relay 94XAB6 is associated with Main Steam Isolation Bypass Valves ABHV0012, ABHV0015, ABHV0018 and ABHV0021.

Redundant relay rack RP209 is located in a different fire area (A-8) and is unaffected by a fire in A-16. In addition, relay rack RP211 is located in fire area A-1 and is unaffected by a fire in A-16.

For an evaluation of the cables associated with these components, see Section 5.2.

References: E-15000, XX-E-013, E-1F9101

5.1.11 Auxiliary Relay Rack RP266

RP266 is an Auxiliary Relay Rack located in area A-16 North in room 1408. The PFSSD function of this panel is to support operation of the Turbine Driven Auxiliary Feedwater Pump (TDAFWP). A fire in area A-16 North will damage this panel and prevent operation of the TDAFWP. The Motor Driven Auxiliary Feedwater Pump A and associated cables are not run through A-16 and are available in the event of a fire in A-16.

For an evaluation of the cables associated with these components, see Section 5.2.

References: E-15000, XX-E-013, E-1F9422B

5.1.12 Reverse Isolation Relay Rack RP331

RP331 is the Reverse Isolation Relay Rack located in the North (Train A) section of area A-16 in room 1408. This relay rack houses PFSSD relays 3XEG8 and 95XGK08 associated with Train B components. Relay 3XEG8 and associated circuits are discussed in Section 5.1.6.

Relay 95XGK08 is an auxiliary relay for the Train B Class 1E Electrical Equipment Cooler SGK05B. This relay controls automatic shutdown of SGK05B prior to Halon actuation in the event of a fire in the Train B Class 1E switchgear rooms (Rooms 3302, 3404 and 3410). Damage to this relay could cause the SGK05B A/C unit to shut down.

Cables 14GKG13BE and 14GKG13BF are control cables for SGK05B and run to relay panel RP331 in area A-16 North. Damage to these cables could prevent automatic operation of SGK05B.

Cable 16GKK31DA is a control cable for fire signal isolation of SGK05B and runs to panel RP331 in area A-16 North. An open in cable 16GKK31DA will initiate a false fire isolation signal and shut down SGK05B. Cable 16RPK09PA provides 125 VDC power to relay 95XGK08 in panel RP331. Damage to this cable will de-energize the relay and cause SGK05B to shut down.

A fire in area A-16 North uses Train B equipment to achieve and maintain PFSSD and requires Train B Class 1E Electrical Equipment. If SGK05B automatically shuts down due to a fire in area A-16 North, the spurious fire isolation signal can be bypassed by placing GKHS0104 on panel RP068 in BYPASS and SGK05B can be started by rotating GKHIS0103 to the RUN position.

Train A Class 1E switchgear unit SGK05A is unaffected by a fire anywhere in area A-16. Cables associated with this unit are run in a separate fire area. If a fire occurs in area A-16 South, Train B components will be lost and Train A components will be used primarily for PFSSD. Therefore, SGK05A is available to supply room cooling to the Train A Class 1E switchgear rooms if the fire occurs in area A-16 South.

Based on the above discussion, a fire in area A-16 involving RP331 will not impact the ability to achieve and maintain PFSSD.

References: E-15000, E-1F9444, E-13GK13, E-13GK13A, E-13GK31, E-13RP09

5.1.13 Auxiliary Relay Rack RP333

RP333 is an Auxiliary Relay Rack located in area A-16 South in room 1408. This relay rack houses PFSSD relay 62TDENB03, Degraded Voltage Trip Block Relay. PFSSD requires that either this relay or relay K617 be available to ensure off-site power is available to NB02.

Relay K617 is located in panel SB032C in fire area C-27 (room 3605) and is unaffected by a fire in area A-16.

Based on Calculation XX-E-013, Appendix 2, off-site power is available using NB01 or NB02 for a fire in area A-16.

For an evaluation of the cables associated with this component, see Section 5.2.

References: E-15000, XX-E-013

5.1.14 Component Cooling Water to Nuclear Auxiliary Components

Valve EGHV0053 is the Train A CCW supply to the service loop. Valve EGHV0054 is the Train B CCW supply to the service loop. The valve on the operating CCW train is required to be open to ensure CCW flow to the seal water heat exchanger and thermal barrier cooling coils on all four reactor coolant pumps. The valve on the non-operating CCW train can remain open because check valves EGV0036 and EGV0061 will prevent flow diversion to the non-operating train.

If the fire occurs in A-16 North, valves EGHV0053 and EGHV0054 are unaffected. Cables 14EGG05DE and 14EGG05DF, associated with EGHV0054, are run in area A-16 North but these cables are fire resistance rated (see CP 12418) and have been tested to maintain their integrity during a postulated fire. Consequently, Train B CCW can be used, valve EGHV0054 can be opened and EGHV0053 can be closed.

If a fire occurs in area A-16 South, Train A CCW is credited. If a fire occurs in area A-16 North, Train B CCW is credited. Valves EGHV0053 and EGHV0054 are located in area A-16 South.

Therefore, a fire in area A-16 South could prevent operation or cause mal-operation of one or both valves. If the fire occurs in A-16 North, valves EGHV0053 and EGHV0054 are unaffected.

If the fire occurs in area A-16 South and Train A CCW is operating at the time of the fire, the valves will be in their proper lineup (EGHV0053 open and EGHV0054 closed) and damage to cables 11EGG05CA and 11EGG05CB will not cause EGHV0053 to close. If the fire occurs in area A-16 South and Train B CCW is operating at the time of the fire, it may be necessary for operators to swap to Train A CCW. However, valve EGHV0053 would be in the closed position and may not be operable because of cable damage. The Train A CCW system is unaffected but CCW flow to the seal water heat exchanger and RCP thermal barrier coolers may not be available.

Calculation BG-M-052 evaluated the case where CCW to the seal water heat exchanger is unavailable. Based on the results of the calculation, the CCP would remain operable as long as the seal return flowpath is isolated and CCW is available to the CCP oil cooler. In this scenario, the CCP is flowing minimum flow to the RCP seals and excess flow is re-circulating back to the pump suction. A fire in area A-16 South does not affect valve BGHV8112. Therefore, operators could isolate seal return using BGHIS8112 in the control room.

Based on the above discussion, a fire in area A-16 North will not adversely impact the ability to line up CCW to the nuclear auxiliary components. However, a fire in area A-16 South could prevent CCW flow to the seal water heat exchanger and RCP thermal barriers if Train B CCW is operating at the time of the fire. This is acceptable based on the discussion in the previous paragraph and due to the availability of RCP seal injection.

Based on the above discussion, a fire in area A-16 will not adversely impact the ability to achieve and maintain safe shutdown.

References: E-15000, XX-E-013, E-13EG05B, E-13EG05D, E-1F9303, M-12BG01, M-12EG02, PIR 2003-1925, CP 12418, Calculation BG-M-052

5.2 PFSSD CABLE EVALUATION

Table A-16-5 lists all the PFSSD cables (S. in E-15000) located in fire area A-16. The applicable evaluation section is listed in Table A-16-5.

Table A-16-5
PFSSD Cables Located in Fire Area A-16

Cable #	Location (Room) (N) North (S) South	Primary PFSSD Equipment	Cable Function (P) Power, (C) Control (I) Instrumentation	Eval. Sect.	Comments
11BBK30CA	N (1408)	BBHV8002A	C	5.2.10	Head Vent Valve
11BGK48CB	N (1408)	BGHV8153A	C	5.2.18	Excess Letdown Isolation Valve
11EFG04AA	N (1406)	EFHV0059	P	5.1.4	ESW Return from CCW A Heat Exchanger
11EFG04AB	N (1406)	EFHV0059	C	5.1.4	ESW Return from CCW A Heat Exchanger
11EFG05AA	N (1406)	EFHV0051	P	5.1.4	ESW A to CCW Heat Exchanger A
11EFG05AB	N (1406)	EFHV0051	C	5.1.4	ESW A to CCW Heat Exchanger A
11EGB01AA	N (1406)	DPEG01A	P	5.1.1	CCW Pump A Motor
11EGB01CA	N (1406)	DPEG01C	P	5.1.1	CCW Pump C Motor
11EGG05AA	N (1408)	EGHV0015	P	5.1.9	CCW A Common Header Return
11EGG05AB	N (1408)	EGHV0015	C	5.1.9	CCW A Common Header Return
11EGG05CA	S (1402)	EGHV0053	P	5.1.14	CCW A to Nuclear Aux Components
11EGG05CB	S (1402)	EGHV0053	C	5.1.14	CCW A to Nuclear Aux Components
11EGG07AA	N (1408)	EGHV0101	P	5.1.8	CCW To RHR Heat Exchanger A Isolation Valve
11EGG07AB	N (1408)	EGHV0101	C	5.1.8	CCW To RHR Heat Exchanger A Isolation Valve
11EGI13AA	N (1406)	EGPT0077	I	5.1.5	CCW Pumps A and C Discharge Pressure
11EGK16AA	N (1406)	EGTV0029/EGTY0029A	C	5.1.6	CCW Heat Exchanger A Bypass Valve
11GLG06AA	N (1406)	DSGL11A	P	5.1.2	Train A CCW Pumps A and C Room Cooler
11GLG06AC	N (1406)	DSGL11A	C	5.1.2	Train A CCW Pumps A and C Room Cooler
11GLY27AB	N (1406)	GLHZ0080	P, C	5.1.2	Train A CCW Pump Room Cooler discharge damper
11GLY27AD	N (1406)	GLHZ0081	P, C	5.1.2	Train A CCW Pump Room Cooler discharge damper

Table A-16-5
PFSSD Cables Located in Fire Area A-16

Cable #	Location (Room) (N) North (S) South	Primary PFSSD Equipment	Cable Function (P) Power, (C) Control (I) Instrumentation	Eval. Sect.	Comments
11SES01BB	N (1406, 1408)	SENE0031	I	5.2.8	Source Range Monitoring
11SES01BC	N (1406, 1408)	SENE0031	I	5.2.8	Source Range Monitoring
11SES07AC	N (1406, 1408)	SENY060A/B	I	5.2.8	Source Range Monitoring
12ABI20FE	N (1406, 1408)	ABPV0002	I	5.2.5	Steam Generator B ARV
12ABI20FG	N (1406, 1408)	ABPV0002	I	5.2.5	Steam Generator B ARV
12ABI20FH	N (1406, 1408)	ABPV0002	I	5.2.5	Steam Generator B ARV
12ABI20FK	N (1406, 1408)	ABPV0002	I	5.2.5	Steam Generator B ARV
12ABI21KA	N (1406, 1408)	ABPT0515	I	5.2.4	SG A Steam line Pressure Transmitter
12ABI21NA	N (1406, 1408)	ABPT0525	I	5.2.4	SG B Steam line Pressure Transmitter
12ABI21SA	N (1406, 1408)	ABPT0535	I	5.2.4	SG C Steam line Pressure Transmitter
12ABI21VA	N (1406, 1408)	ABPT0545	I	5.2.4	SG D Steam line Pressure Transmitter
12ABK01AE	N (1406, 1408)	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12ABK01AF	N (1406, 1408)	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12ABK01BE	N (1406, 1408)	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12ABK01BF	N (1406, 1408)	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12AEI08EB	N, S (1406, 1408)	AELT0519	I	5.2.6	SG A Narrow Range Level Indication
12AEI08FB	N, S (1406, 1408)	AELT0549	I	5.2.6	SG D Narrow Range Level Indication
12AEI08GB	N (1406, 1408)	AELT0502	I	5.2.6	SG B Wide Range Level Indication
12AEI12BB	N (1406, 1408)	AELT0552	I	5.2.6	SG B Narrow Range Level Indication
12AEI12CB	N (1406, 1408)	AELT0553	I	5.2.6	SG C Narrow Range Level Indication
12ALI07KD	N (1406, 1408)	ALPT0026	I	5.2.1	TDAFP PAL02 Suction Pressure Transmitter
12ALI07KE	N (1406, 1408)	ALPI0026B	I	5.2.1	TDAFP PAL02 Suction Pressure Transmitter
12ALI08BA	N (1406, 1408)	ALPT0038	I	5.2.3	ESFAS Low Suction Pressure

Table A-16-5
PFSSD Cables Located in Fire Area A-16

Cable #	Location (Room) (N) North (S) South	Primary PFSSD Equipment	Cable Function (P) Power, (C) Control (I) Instrumentation	Eval. Sect.	Comments
12BBI15EB	N, S (1406, 1408)	BBTE413B	I	5.2.15	RCS Cold Leg Loop 1 Temperature Element
12BBI15HB	N, S (1406, 1408)	BBTE423B	I	5.2.15	RCS Cold Leg Loop 2 Temperature Element
12BBI15JB	N, S (1406, 1408)	BBTE443A	I	5.2.15	RCS Hot Leg Loop 4 Temperature Element
12BBI15KB	N, S (1406, 1408)	BBTE433A	I	5.2.15	RCS Hot Leg Loop 3 Temperature Element
12BBI15NB	N, S (1406, 1408)	BBPT0403	I	5.2.14	RCS Wide Range Hot Leg Pressure
12BBI16LB	N, S (1406, 1408)	BBPT0456	I	5.1.7 5.2.4	Pressurizer Pressure Transmitter
12BBI16QB	N, S (1406, 1408)	BBLT0460	I	5.2.12	Pressurizer Level Indication
12FCK23AD	N (1408)	FCHV0312	C	5.2.1	TDAFP Trip and Throttle Valve
12FCK23AR	N (1406, 1408)	FCHV0312	P	5.2.1	TDAFP Trip and Throttle Valve
12FCK23AS	N (1406, 1408)	FCHV0312	C	5.2.1	TDAFP Trip and Throttle Valve
12FCK23AU	N (1406, 1408)	FCHV0312	P	5.2.1	TDAFP Trip and Throttle Valve
12FCK24AA	N (1408)	FCFV0313	C	5.2.1	TDAFP Speed-Governing Valve
12FCK24AK	N (1406, 1408)	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12FCK24AQ	N (1406, 1408)	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12GNI05BA	N, S (1406, 1408)	GNPT0936	I	5.2.4	Containment Pressure Transmitter
12RPK09AA	N (1406, 1408)	FCFV0313	P	5.2.1	TDAFP Speed-Governing Valve
12RPK15AA	N (1406, 1408)	FCHV0312	C	5.2.1	TDAFP Trip and Throttle Valve
12RPK15BA	N (1406, 1408)	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12RPK15CA	N (1406, 1408)	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12SAZ23AA	N (1406, 1408)	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12SAZ23BA	N (1406, 1408)	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12SES02BB	N, S (1406, 1408)	SENE0032	I	5.2.8	Source Range Monitoring

Table A-16-5
PFSSD Cables Located in Fire Area A-16

Cable #	Location (Room) (N) North (S) South	Primary PFSSD Equipment	Cable Function (P) Power, (C) Control (I) Instrumentation	Eval. Sect.	Comments
12SES02BC	N, S (1406, 1408)	SENE0032	I	5.2.8	Source Range Monitoring
13ABI20GA	N (1406, 1408)	ABPV0003	I	5.2.5	Steam Generator C ARV
13ABI20GC	N (1406, 1408)	ABPV0003	I	5.2.5	Steam Generator C ARV
13ABI20GD	N (1406, 1408)	ABPV0003	I	5.2.5	Steam Generator C ARV
13ABI20GE	N (1406, 1408)	ABPV0003	I	5.2.5	Steam Generator C ARV
13ABI21PA	N (1406, 1408)	ABPT0526	I	5.2.4	SG B Steam line Pressure Transmitter
13ABI21TA	N (1406, 1408)	ABPT0536	I	5.2.4	SG C Steam line Pressure Transmitter
13AEI08GB	N (1406, 1408)	AELT0503	I	5.2.6	SG C Wide Range Level
13AEI08HB	N (1406, 1408)	AELT0518	I	5.2.6	SG A Narrow Range Level
13AEI08JB	N (1406, 1408)	AELT0528	I	5.2.6	SG B Narrow Range Level
13AEI08KB	N (1406, 1408)	AELT0538	I	5.2.6	SG C Narrow Range Level
13AEI08LB	N (1406, 1408)	AELT0548	I	5.2.6	SG D Narrow Range Level
13BBI16MB	N (1406, 1408)	BBPT0457	I	5.1.7 5.2.4 5.2.31	Pressurizer Pressure Transmitter
13GNI05CA	N (1406, 1408)	GNPT0935	I	5.2.4	Containment Pressure Transmitter
14ABI20HE	N (1406, 1408)	ABPV0004	I	5.2.5	Steam Generator D ARV
14ABI20HG	N (1406, 1408)	ABPV0004	I	5.2.5	Steam Generator D ARV
14ABI20HH	N (1406, 1408)	ABPV0004	I	5.2.5	Steam Generator D ARV
14ABI20HK	N (1406, 1408)	ABPV0004	I	5.2.5	Steam Generator D ARV
14ABI21LA	N (1406, 1408)	ABPT0516	I	5.2.4	SG A Steam line Pressure Transmitter
14ABI21WA	N (1406, 1408)	ABPT0546	I	5.2.4	SG D Steam line Pressure Transmitter
14ABK23FA	N, S (1402, 1406, 1408)	ABHV0012	C	5.2.2	Main Steam Isolation Valve ABHV0011 Bypass Valve

Table A-16-5
PFSSD Cables Located in Fire Area A-16

Cable #	Location (Room) (N) North (S) South	Primary PFSSD Equipment	Cable Function (P) Power, (C) Control (I) Instrumentation	Eval. Sect.	Comments
14ABK23FB	N, S (1402, 1406, 1408)	ABHV0015	C	5.2.2	Main Steam Isolation Valve ABHV0014 Bypass Valve
14ABK23FC	N, S (1402, 1406, 1408)	ABHV0018	C	5.2.2	Main Steam Isolation Valve ABHV0017 Bypass Valve
14ABK23FD	N, S (1402, 1406, 1408)	ABHV0021	C	5.2.2	Main Steam Isolation Valve ABHV0020 Bypass Valve
14ABK23FE	S (1402)	ABHV0012, 15, 18, 21	C	5.2.2	Main Steam Isolation Valve ABHV0011, 14, 17, 20 Bypass Valve
14ABK23FF	S (1402)	ABHV0012, 15, 18, 21	C	5.2.2	Main Steam Isolation Valve ABHV0011, 14, 17, 20 Bypass Valve
14ABK23FG	S (1402)	ABHV0012, 15, 18, 21	C	5.2.2	Main Steam Isolation Valve ABHV0011, 14, 17, 20 Bypass Valve
14ABK28AH	N (1406, 1408)	ABHV0017	C	5.2.2	Steam Generator B Main Steam Isolation Valve
14ABK28BH	N (1406, 1408)	ABHV0011	C	5.2.2	Steam Generator D Main Steam Isolation Valve
14ABK29AH	N (1406, 1408)	ABHV0014	C	5.2.2	Steam Generator A Main Steam Isolation Valve
14ABK29BH	N (1406, 1408)	ABHV0020	C	5.2.2	Steam Generator C Main Steam Isolation Valve
14AEI08LB	S (1402, 1408)	AELT0504	I	5.2.6	SG D Wide Range Level Indication
14AEI08NB	S (1402, 1408)	AELT0517	I	5.2.6	SG A Narrow Range Level Indication
14AEI08PB	S (1402, 1408)	AELT0527	I	5.2.6	SG B Narrow Range Level Indication
14AEI08QB	S (1402, 1408)	AELT0537	I	5.2.6	SG C Narrow Range Level Indication
14AEI08RB	S (1402, 1408)	AELT0547	I	5.2.6	SG D Narrow Range Level Indication
14AEK16AH	N (1406, 1408)	AEFV0040	C	5.2.16	SG B Main Feedwater Isolation Valve
14AEK16BH	N (1406, 1408)	AEFV0042	C	5.2.16	SG D Main Feedwater Isolation Valve

Table A-16-5
PFSSD Cables Located in Fire Area A-16

Cable #	Location (Room) (N) North (S) South	Primary PFSSD Equipment	Cable Function (P) Power, (C) Control (I) Instrumentation	Eval. Sect.	Comments
14AEK17AH	N (1406, 1408)	AEFV0039	C	5.2.16	SG A Main Feedwater Isolation Valve
14AEK17BH	N (1406, 1408)	AEFV0041	C	5.2.16	SG C Main Feedwater Isolation Valve
14ALB01B1	N (1406, 1408)	DPAL01B	C	5.2.1	Train B MDAFP
14ALB01BD	N (1406, 1408)	DPAL01B	C	5.2.1	Train B MDAFP
14ALB01BM	N (1406, 1408)	DPAL01B	C	5.2.1	RP118B HS for AFW Pump B
14ALB01BP	N (1406, 1408)	DPAL01B	C	5.2.1	Train B MDAFP
14ALB01BR	N (1406, 1408)	DPAL01B	C	5.2.1	Train B MDAFP
14ALG02AA	N (1406, 1408)	ALHV0034	P	5.2.1	MDAFW Pump B Suction from CST
14ALG02AB	N (1406, 1408)	ALHV0034	C	5.2.1	MDAFW Pump B Suction from CST
14ALG02AD	N (1406, 1408)	ALHV0034	C	5.2.1	RP118B HS for MDAFW Pump B Suction from CST
14ALG02AJ	N (1406, 1408)	ALHV0034	C	5.2.1	MDAFW Pump B Suction from CST
14ALG04AA	N (1406, 1408)	ALHV0030	P	5.2.1	ESW to MDAFW B
14ALG04AB	N (1406, 1408)	ALHV0030	C	5.2.1	ESW to MDAFW B
14ALG04AD	N (1406, 1408)	ALHV0030	C	5.2.1	ESW to MDAFW B
14ALG04AJ	N (1406, 1408)	ALHV0030	C	5.2.1	ESW to MDAFW B
14ALG04DA	N (1406, 1408)	ALHV0033	C	5.2.1	TDAFP Suction Valve from ESW
14ALG04DB	N (1406, 1408)	ALHV0033	P	5.2.1	TDAFP Suction Valve from ESW
14ALG04DD	N (1406, 1408)	ALHV0033	C	5.2.1	TDAFP Suction Valve from ESW
14ALG04DJ	N (1406, 1408)	ALHV0033	C	5.2.1	TDAFP Suction Valve from ESW
14ALI03AG	N (1406, 1408)	ALHV0005	I	5.2.1	MDAFW Pump B Discharge to SG D
14ALI03AH	N (1406, 1408)	ALHV0005	I	5.2.1	MDAFW Pump B Discharge to SG D
14ALI03AJ	N (1406, 1408)	ALHV0005	I	5.2.1	MDAFW Pump B Discharge to SG D

Table A-16-5
PFSSD Cables Located in Fire Area A-16

Cable #	Location (Room) (N) North (S) South	Primary PFSSD Equipment	Cable Function (P) Power, (C) Control (I) Instrumentation	Eval. Sect.	Comments
14ALI03AK	N (1406, 1408)	ALHV0005	I	5.2.1	MDAFW Pump B Discharge to SG D
14ALI03AL	N (1406, 1408)	ALHV0005	I	5.2.1	MDAFW Pump B Discharge to SG D
14ALI03BC	N (1406, 1408)	ALHV0007	I	5.2.1	MDAFW Pump B Discharge to SG A
14ALI03BD	N (1406, 1408)	ALHV0007	I	5.2.1	MDAFW Pump B Discharge to SG A
14ALI03BE	N (1406, 1408)	ALHV0007	I	5.2.1	MDAFW Pump B Discharge to SG A
14ALI03BF	N (1406, 1408)	ALHV0007	I	5.2.1	MDAFW Pump B Discharge to SG A
14ALI05AG	N (1406, 1408)	ALHV0010	I	5.2.1	TDAFP to SG B AFW Control
14ALI05AH	N (1406, 1408)	ALHV0010	I	5.2.1	TDAFP to SG B AFW Control
14ALI05AJ	N (1406, 1408)	ALHV0010	I	5.2.1	TDAFP to SG B AFW Control
14ALI05AK	N (1406, 1408)	ALHV0010	I	5.2.1	TDAFP to SG B AFW Control
14ALI05AN	N (1406, 1408)	ALHV0010	I	5.2.1	TDAFP to SG B AFW Control
14ALI05BC	N (1406, 1408)	ALHV0012	I	5.2.1	TDAFP to SG C AFW Control
14ALI05BD	N (1406, 1408)	ALHV0012	I	5.2.1	TDAFP to SG C AFW Control
14ALI05BE	N (1406, 1408)	ALHV0012	I	5.2.1	TDAFP to SG C AFW Control
14ALI05BF	N (1406, 1408)	ALHV0012	I	5.2.1	TDAFP to SG C AFW Control
14ALI07AD	N (1406, 1408)	ALHV0005	I	5.2.1	MDAFW Pump B Discharge to SG D
14ALI07AE	N (1406, 1408)	ALHV0005	I	5.2.1	MDAFW Pump B Discharge to SG D
14ALI07HD	N (1406, 1408)	ALPT0024	I	5.2.1	MDAFW Pump PAL01B Suction Pressure Transmitter
14ALI07HE	N (1406, 1408)	ALPT0024	I	5.2.1	MDAFW Pump PAL01B Suction Pressure Transmitter
14ALI08CA	N (1406, 1408)	ALPT0039	I	5.2.3	ESFAS Low Suction Pressure
14ALI09AA	N (1406, 1408)	ALHV0007	I	5.2.1	MDAFW Pump B Discharge to SG A
14ALK01BA	N (1406, 1408)	DPAL01B	C	5.2.1	Train B MDAFP

Table A-16-5
PFSSD Cables Located in Fire Area A-16

Cable #	Location (Room) (N) North (S) South	Primary PFSSD Equipment	Cable Function (P) Power, (C) Control (I) Instrumentation	Eval. Sect.	Comments
14ALY09AB	N (1406, 1408)	ALHV0005	P	5.2.1	MDAFW Pump B Discharge to SG D
14ALY09BB	N (1406, 1408)	ALHV0007	P	5.2.1	MDAFW Pump B Discharge to SG A
14BBG04AA	S (1402, 1408)	BBHV8351A	P	5.2.11	RCP Seal Injection
14BBG04AB	S (1402, 1408)	BBHV8351A	C	5.2.11	RCP Seal Injection
14BBG04BA	S (1402, 1408)	BBHV8351B	P	5.2.11	RCP Seal Injection
14BBG04BB	S (1402, 1408)	BBHV8351B	C	5.2.11	RCP Seal Injection
14BBG04CA	S (1402, 1408)	BBHV8351C	P	5.2.11	RCP Seal Injection
14BBG04CB	S (1402, 1408)	BBHV8351C	C	5.2.11	RCP Seal Injection
14BBG04DA	S (1402, 1408)	BBHV8351D	P	5.2.11	RCP Seal Injection
14BBG04DB	S (1402, 1408)	BBHV8351D	C	5.2.11	RCP Seal Injection
14BBG12AC	S (1402, 1408)	BBPV8702A	C	5.2.14	RCS to RHR Pump A Suction
14BBG12AD	S (1402, 1408)	BBPV8702A	C	5.2.14	RCS to RHR Pump A Suction
14BBG12AE	S (1408)	BBPV8702A	C	5.2.14	RCS to RHR Pump A Suction
14BBG12AF	S (1402, 1408)	BBPV8702A	C	5.2.14	RCS to RHR Pump A Suction
14BBG12AG	S (1402, 1408)	BBPV8702A	C	5.2.14	RCS to RHR Pump A Suction
14BBG12BC	S (1402, 1408)	BBPV8702B	C	5.2.14	RCS to RHR Pump B Suction
14BBG12BD	S (1402, 1408)	BBPV8702B	C	5.2.14	RCS to RHR Pump B Suction
14BBG12BF	S (1402, 1408)	BBPV8702B	C	5.2.14	RCS to RHR Pump B Suction
14BBG12BG	S (1402, 1408)	BBPV8702B	C	5.2.14	RCS to RHR Pump B Suction
14BBG12BK	S (1408)	BBPV8702B	C	5.2.14	RCS to RHR Pump B Suction
14BBG39BC	S (1402, 1408)	BBHV8000B	C	5.1.7	Pressurizer PORV Block Valve
14BBG39BF	S (1402, 1408)	BBHV8000B	C	5.1.7	Pressurizer PORV Block Valve
14BBG39BJ	S (1402, 1408)	BBHV8000B	C	5.1.7	Pressurizer PORV Block Valve

Table A-16-5
PFSSD Cables Located in Fire Area A-16

Cable #	Location (Room) (N) North (S) South	Primary PFSSD Equipment	Cable Function (P) Power, (C) Control (I) Instrumentation	Eval. Sect.	Comments
14BBI16BA	S (1402, 1408)	BBPT0406	C	5.2.13	RCS Pressure Indication
14BBI16NB	S (1402, 1408)	BBPT0458	I	5.1.7 5.2.4	Pressurizer Pressure Transmitter
14BBK30BA	N, S (1406, 1408)	BBHV8001B	C	5.2.10	Head Vent Valve
14BBK30DA	S (1402, 1408)	BBHV8002B	C	5.2.10	Head Vent Valve
14BBK40BG	S (1408)	BBPCV0456A	P	5.1.7	Pressurizer PORV
14BBK40BJ	S (1408)	BBPCV0456A	C	5.1.7	Pressurizer PORV
14BBK40BK	S (1402, 1408)	BBPCV0456A	C	5.1.7	Pressurizer PORV
14BBK40BL	S (1402, 1408)	BBPCV0456A	P	5.1.7	Pressurizer PORV
14BBK40BM	S (1402, 1408)	BBPCV0456A	C	5.1.7	Pressurizer PORV
14BBK40BN	S (1402, 1408)	BBPCV0456A	P	5.1.7	Pressurizer PORV
14BGG11AA	N (1406, 1408)	BGHV8105	P	5.2.17	Charging Pumps to Regenerative Heat Exchanger
14BGG11AB	N (1406, 1408)	BGHV8105	C	5.2.17	Charging Pumps to Regenerative Heat Exchanger
14BGG12BA	N (1406, 1408)	BGLCV0112C	P	5.2.19	VCT Outlet Valve
14BGG12BB	N (1406, 1408)	BGHIS0112C	C	5.2.19	VCT Outlet Valve Hand Switch
14BGI51BA	S (1402, 1408)	BGFT0215B	I	5.2.11	RCP Seal Total Flow Transmitter
14BGI51DA	N (1406)	BGLT0185	I	5.2.19	VCT Level Transmitter
14BGK48AB	N, S (1406, 1408)	BGHV8153B	C	5.2.18	Excess Letdown Isolation Valve
14BGK48BB	S (1402, 1408)	BGHV8154B	C	5.2.18	Excess Letdown Isolation Valve
14BMK06AA	N (1406, 1408)	BMHV0001	C	5.2.20	SG A to Blowdown Flash Tank Isolation Valve
14BMK06AC	S (1402)	BMHV0001	C	5.2.20	SG A to Blowdown Flash Tank Isolation Valve

Table A-16-5
PFSSD Cables Located in Fire Area A-16

Cable #	Location (Room) (N) North (S) South	Primary PFSSD Equipment	Cable Function (P) Power, (C) Control (I) Instrumentation	Eval. Sect.	Comments
14BMK06BA	N (1406, 1408)	BMHV0002	C	5.2.20	SG B to Blowdown Flash Tank Isolation Valve
14BMK06BC	S (1402)	BMHV0002	C	5.2.20	SG B to Blowdown Flash Tank Isolation Valve
14BMK06CA	N (1406, 1408)	BMHV0003	C	5.2.20	SG C to Blowdown Flash Tank Isolation Valve
14BMK06CC	S (1402)	BMHV0003	C	5.2.20	SG C to Blowdown Flash Tank Isolation Valve
14BMK06DA	N (1406, 1408)	BMHV0004	C	5.2.20	SG D to Blowdown Flash Tank Isolation Valve
14BMK06DC	S (1402)	BMHV0004	C	5.2.20	SG D to Blowdown Flash Tank Isolation Valve
14BNI07FA	S (1402, 1408)	BNLT0933	C	5.2.21	RWST Level Transmitter
14EFG04BA	S (1401, 1408)	EFHV0060	P	5.1.4	ESW B Return from CCW B
14EFG04BB	S (1401, 1408)	EFHV0060	C	5.1.4	ESW B Return from CCW B
14EFG05BA	S (1401, 1408)	EFHV0052	P	5.1.4	ESW B to CCW B
14EFG05BB	S (1401, 1408)	EFHV0052	C	5.1.4	ESW B to CCW B
14EFG07BC	S (1402, 1408)	EFHV0032	C	5.2.23	Train B Containment Cooler
14EFG08BC	S (1402, 1408)	EFHV0050	C	5.2.23	Train B Containment Cooler
14EFG09BC	S (1402, 1408)	EFHV0034	C	5.2.23	Train B Containment Cooler
14EFG09DC	S (1402, 1408)	EFHV0046	C	5.2.23	Train B Containment Cooler
14EGB01BA	S (1401)	DPEG01B	P	5.1.1	CCW Pump B Motor
14EGB01DA	S (1401)	DPEG01D	P	5.1.1	CCW Pump D Motor
14EGG05BD	S (1402)	EGHV0016	P	5.1.9	CCW B Common Header Return
14EGG05BE	S (1402)	EGHV0016	C	5.1.9	CCW B Common Header Return

Table A-16-5
PFSSD Cables Located in Fire Area A-16

Cable #	Location (Room) (N) North (S) South	Primary PFSSD Equipment	Cable Function (P) Power, (C) Control (I) Instrumentation	Eval. Sect.	Comments
14EGG05BF	S (1402)	EGHV0016	P	5.1.9	CCW B Common Header Return
14EGG05BG	S (1402)	EGHV0016	C	5.1.9	CCW B Common Header Return
14EGG05DE	S (1402)	EGHV0054	C	5.1.14	CCW B to Nuclear Aux Components
14EGG05DF	S (1402)	EGHV0054	P	5.1.14	CCW B to Nuclear Aux Components
14EGG05DG	S (1401, 1402, 1408)	EGHV0054	P	5.1.14	CCW B to Nuclear Aux Components
14EGG05DH	S (1401, 1402, 1408)	EGHV0054	C	5.1.14	CCW B to Nuclear Aux Components
14EGG07BA	S (1402)	EGHV0102	P	5.1.8	CCW To RHR Heat Exchanger B Isolation Valve
14EGG07BB	S (1402)	EGHV0102	C	5.1.8	CCW To RHR Heat Exchanger B Isolation Valve
14EGG09CA	N (1406, 1408)	EGHV0071	P	5.2.24	CCW HX Out to RCS Ctmt Isolation
14EGG09CB	N (1406, 1408)	EGHV0071	C	5.2.24	CCW HX Out to RCS Ctmt Isolation
14EGG10AC	S (1402, 1408)	EGHV0062	C	5.2.24	CCW Return from RCP Thermal Barrier
14EGG10AD	S (1402, 1408)	EGHV0062	C	5.2.24	CCW Return from RCP Thermal Barrier
14EGG18BA	N, S (1406, 1408)	EGHV0127	P	5.2.24	CCW HX Out to RCS Bypass Isolation
14EGG18BB	N, S (1406, 1408)	EGHV0127	C	5.2.24	CCW HX Out to RCS Bypass Isolation
14EGG18BC	S (1402, 1408)	EGHV0127	C	5.2.24	CCW HX Out to RCS Bypass Isolation
14EGG18BD	S (1402, 1408)	EGHV0127	C	5.2.24	CCW HX Out to RCS Bypass Isolation
14EGG18DA	N, S (1406, 1408)	EGHV0133	P	5.2.24	EGHV0061 Bypass Valve
14EGG18DB	N, S (1406, 1408)	EGHV0133	C	5.2.24	EGHV0061 Bypass Valve
14EGG18DC	S (1402, 1408)	EGHV0133	C	5.2.24	EGHV0061 Bypass Valve
14EGG18DD	S (1402, 1408)	EGHV0133	C	5.2.24	EGHV0061 Bypass Valve

Table A-16-5
PFSSD Cables Located in Fire Area A-16

Cable #	Location (Room) (N) North (S) South	Primary PFSSD Equipment	Cable Function (P) Power, (C) Control (I) Instrumentation	Eval. Sect.	Comments
14EGI13BA	S (1401, 1402)	EGPT0078	I	5.1.5	CCW Pumps B and D Discharge Pressure
14EGI15AA	N (1406, 1408)	EGFT0062	I	5.2.24	CCW Flow from RCP Thermal Barriers
14EGI19BB	N (1406, 1408)	EGFT0129	I	5.2.24	CCW to RCP Flow Transmitter
14EGK16BA	S (1401, 1402)	EGTV0030/EGTY0030A	C	5.1.6	CCW Heat Exchanger B Bypass Isolation
14EGK16BC	N (1406, 1408)	EGTV0030/EGTY0030A	C	5.1.6	CCW Heat Exchanger B Bypass Isolation
14EJG06BC	S (1402, 1408)	EJHV8811B	C	5.2.21	Containment Sump Isolation Valve
14EJG06BF	S (1402, 1408)	EJHV8811B	C	5.2.21	Interlock to BNHV8812B
14EJG06BJ	S (1408)	EJHV8811B	P	5.2.21	Containment Sump Isolation Valve
14EJG06BK	S (1408)	EJHV8811B	C	5.2.21	Containment Sump Isolation Valve
14EJG06BT	S (1408)	EJHV8811B	C	5.2.21	Containment Sump Isolation Valve
14EJG09AC	S (1402, 1408)	EJHV8840	C	5.2.25	RHR to RCS Hot Leg Loops 2 and 3
14EJG09AD	S (1402, 1408)	EJHV8840	C	5.2.25	RHR to RCS Hot Leg Loops 2 and 3
14EJG09BC	S (1402, 1408)	EJHV8809B	C	5.2.14	RHR to RCS Cold Leg Loops 3 and 4
14EJG09BD	S (1402, 1408)	EJHV8809B	C	5.2.14	RHR to RCS Cold Leg Loops 3 and 4
14EMG02BA	N (1406, 1408)	EMHV8803B	P	5.2.26	Charging Pump B to BIT Inlet Isolation Valve
14EMG02BB	N (1406, 1408)	EMHV8803B	C	5.2.26	Charging Pump B to BIT Inlet Isolation Valve
14EMG02DA	N (1406, 1408)	EMHV8801B	P	5.2.26	BIT Outlet Isolation Valve
14EMG02DB	N (1406, 1408)	EMHV8801B	C	5.2.26	BIT Outlet Isolation Valve
14EMK04CA	S (1402, 1408)	EMHV8843	C	5.2.27	Boron Injection Upstream Test Line
14EMK04EA	S (1402, 1408)	EMHV8871	C	5.2.27	SI Test Line from BIT
14ENG03BC	S (1402, 1408)	ENHV0012	C	5.2.4	Containment Spray Isolation Valve
14ENG03BD	S (1402, 1408)	ENHV0012	C	5.2.4	Containment Spray Isolation Valve
14EPG02CE	S (1402, 1408)	EPHV8808B	C	5.2.28	Accumulator Tank B Isolation Valve

Table A-16-5
PFSSD Cables Located in Fire Area A-16

Cable #	Location (Room) (N) North (S) South	Primary PFSSD Equipment	Cable Function (P) Power, (C) Control (I) Instrumentation	Eval. Sect.	Comments
14EPG02DE	S (1402, 1408)	EPHV8808D	C	5.2.28	Accumulator Tank D Isolation Valve
14FCK21AA	N (1406, 1408)	FCFV0310	C	5.2.1	TDAFP Steam Drain Trap Isolation Valve
14GFG01BA	N (1406, 1408)	DSGF02B	P	5.2.22	AFW Pump B Room Cooler
14GFG01BB	N (1406, 1408)	DSGF02B	C	5.2.22	AFW Pump B Room Cooler
14GKG02BE	N (1406, 1408)	SGK04B	C	5.2.32	Train B Control Room A/C
14GKG13BE	N (1406, 1408)	SGK05B	C	5.1.12	Train B Class 1E Electrical Equipment Room Cooler
14GKG13BF	N (1406, 1408)	SGK05B	C	5.1.12	Train B Class 1E Electrical Equipment Room Cooler
14GLG06BA	S (1401, 1402, 1408)	DSGL11B	P	5.1.2	Train B CCW Pumps B and D Room Cooler
14GLG06BC	S (1401, 1402, 1408)	DSGL11B	C	5.1.2	Train B CCW Pumps B and D Room Cooler
14GNG02BD	S (1402, 1408)	DSGN01B	C	5.2.23	Train B Containment Cooler
14GNG02BH	S (1402, 1408)	DSGN01B	C	5.2.23	Train B Containment Cooler
14GNG02BJ	N (1406, 1408)	DSGN01B	C	5.2.23	Train B Containment Cooler
14GNG02BK	N (1406, 1408)	DSGN01B	C	5.2.23	Train B Containment Cooler
14GNG02DD	S (1402, 1408)	DSGN01D	C	5.2.23	Train B Containment Cooler
14GNG02DH	S (1402, 1408)	DSGN01D	C	5.2.23	Train B Containment Cooler
14GNG02DJ	N (1406, 1408)	DSGN01D	C	5.2.23	Train B Containment Cooler
14GNG02DK	N (1406, 1408)	DSGN01D	C	5.2.23	Train B Containment Cooler
14JEG01BD	N (1406, 1408)	DPJE01B	C	5.2.33	Train B EDG Fuel Oil Transfer Pump
14NBB14AD	S (1402, 1408)	NB0209	C	5.2.29	Off-site power feeder breaker to class 1E 4160 VAC switchgear NB02
14NGG01AD	S (1408)	NG02B	P	5.2.29	Train B 480 VAC Class 1E MCC

Table A-16-5
PFSSD Cables Located in Fire Area A-16

Cable #	Location (Room) (N) North (S) South	Primary PFSSD Equipment	Cable Function (P) Power, (C) Control (I) Instrumentation	Eval. Sect.	Comments
14NGG01AE	S (1408)	NG02B	P	5.2.29	Train B 480 VAC Class 1E MCC
14NGG01AJ	S (1408)	DSGN01B	P	5.2.23	Train B Containment Cooler
14NGG01BF	S (1408)	DSGN01D	P	5.2.23	Train B Containment Cooler
14PNG01AE	S (1402, 1408)	PN08	P	5.2.7	RL017/RL018 Power
14RPK09AA	S (1402)	RP210	P	5.2.20	Isolation relay enclosure for BMHV1, 2, 3 and 4
14RPK15BA	N (1406, 1408)	ALHV0030 ALHV0034 86XRP5	C	5.2.1 5.2.30	ESW to MDAFW Pump B MDAFW Pump B Suction from CST ALHV0030 and ALHV0034 lockout relay
14RPK15CA	N (1406, 1408)	ALHV0033 86XRP6	C	5.2.1 5.2.30	TDAFP Suction Valve from ESW ALHV0033 and ABPV0004 lockout relay
14RPK15DA	N (1406, 1408)	DPAL01B 86XRP7	C	5.2.1 5.2.30	AFW Pump B Motor DPAL01B lockout relay
14SBS16AA	N (1406, 1408)	BBTI0423X	I	5.2.9	RCS Temperature Indication on RP118B
14SBS16EA	N (1406, 1408)	BBTI0443A	I	5.2.9	RCS Temperature Indication on RP118B
14SBS16MA	N (1406, 1408)	AELI0517X	I	5.2.6	SG A Narrow Range Level Indication on RP118B
14SBS16NA	N (1406, 1408)	BBPI0406X	I	5.2.13	RCS Pressure Indication on RP118B
14SBS16PA	N (1406, 1408)	AELI0537X	I	5.2.6	SG C Narrow Range Level Indication on RP118B
14SBS16XA	N (1406, 1408)	AELI0502A	I	5.2.6	SG B Wide Range Level Indication on RP118B
14SBS16YA	N (1406, 1408)	AELI0504A	I	5.2.6	SG D Wide Range Level Indication on RP118B
14SBS16ZA	N (1406, 1408)	BBLI0460B	I	5.2.12	Pressurizer Level Indication
14SES07BB	N (1406, 1408)	SENY061B	I	5.2.8	Source Range Monitoring

Table A-16-5
PFSSD Cables Located in Fire Area A-16

Cable #	Location (Room) (N) North (S) South	Primary PFSSD Equipment	Cable Function (P) Power, (C) Control (I) Instrumentation	Eval. Sect.	Comments
15PGA10AA	S (1408)	PA0105	C	5.2.34	Load Centers PG11, PG13 and PG25 Fdr Bkr
16EJI12BA	S (1402)	EJHY0607	I	5.2.14	RHR B Discharge Control Valve Positioner
16GKK31DA	N, S (1402, 1406, 1408)	95XGK08	C	5.1.12	Fire Signal Shutdown Interlock for SGK05B
16PGA10CA	S (1402, 1408)	PA0206	C	5.2.34	Load Centers PG12, PG16 and PG26 Fdr Bkr
16RPK09PA	N, S (1402, 1406, 1408)	95XGK08	P	5.1.12	Fire Signal Shutdown Interlock for SGK05B

5.2.1 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire auxiliary feedwater (AFW) demand to achieve cold shutdown. However, as discussed in Section 5.2.3, the AFW supply could spuriously swap over to ESW.

A number of cables associated with various valves and components in the auxiliary feedwater (AFW) system are run through A-16 North. There are no AFW cables or components in fire area A-16 South. The cables in area A-16 North are associated with the TDAFP and the Train B MDAFP. Also, cables associated with ALPT0038 and ALPT0039 are run in fire area A-16 North. The impact of fire damage to ALPT0038 and ALPT0039 circuits is discussed in Section 5.2.3. The Train A MDAFP and associated suction and discharge valves are unaffected by a fire anywhere in area A-16.

Damage to the AFW cables in A-16 North could prevent operation of the TDAFP and the Train B MDAFP. The Train A MDAFP is unaffected by a fire in area A-16 North.

To prevent uncontrolled cooldown through the TDAFP, valves ABHV0005 and ABHV0006 or valves FCHV0312 or FCHV0313 are required to be closed. Valve FCHV0312 is located downstream of valves ABHV0005 and ABHV0006 in the 4-inch steam line to PAL02. This valve is normally closed and will prevent uncontrolled blowdown if valves ABHV0005 or ABHV0006 were to spuriously open. Valve FCHV0313 is located downstream of valve FCHV0312. This valve controls steam pressure entering the TDAFP turbine to control pump speed.

Cables associated with ABHV0005, ABHV0006, FCHV0312 and FCFV0313 are run in area A-16 North. Damage to cables associated with these valves could cause all four valves to spuriously open at the same time, causing uncontrolled blowdown through the TDAFP. If this occurs, the TDAFP will trip on high speed and valve FCFV0313 would mechanically shut, isolating the blowdown path.

Valve FCFV0310 is on a 1-inch line downstream of the steam trap. Damage to cables associated with this valve could prevent closing the valve from the control room. Uncontrolled blowdown through this 1-inch line will not cause unacceptable RCS cooldown and will not impact PFSSD.

Based on the above discussion, auxiliary feedwater is available if a fire occurs in area A-16 North using the Train A MDAFP to supply steam generators B and C. Auxiliary feedwater is unaffected by a fire in area A-16 South.

References: E-15000, XX-E-013, E-13AB01, E-13AB01A, E-13AL01B, E-13FC23, E-1F9101, M-12FC02, M-12AB02,

5.2.2 Steam Generator Main Steam Isolation Valves (MSIVs) and Bypass Valves

PFSSD requires the MSIVs and bypass valves be closed to prevent reactivity addition due to uncontrolled cooldown. The MSIVs and bypass valves are closed from the control room using all close hand switches ABHS0079 or ABHS0080.

Each MSIV is designed to utilize system fluid (main steam) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main steam. This is done by actuating either all close hand switch ABHS0079 (separation group 4) or ABHS0080 (separation group 1) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MSIV	ABHS0079 (Sep Group 4)		ABHS0080 (Sep Group 1)	
	Solenoids	Cable	Solenoids	Cable
ABHV0011	MV2, MV4, MV6	14ABK28BH	MV1, MV3, MV5	11ABK29BH
ABHV0014	MV2, MV4, MV6	14ABK29AH	MV1, MV3, MV5	11ABK28AH
ABHV0017	MV2, MV4, MV6	14ABK28AH	MV1, MV3, MV5	11ABK29AH
ABHV0020	MV2, MV4, MV6	14ABK29BH	MV1, MV3, MV5	11ABK28BH

All 4 cables associated with the 12 separation group 4 solenoid valves are run in area A-16 North. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 1 cables associated with hand switch ABHS0080 are unaffected by a fire in area A-16 North. Therefore, hand switch ABHS0080 is available to close the four MSIVs. Fire Area A-16 South has no cables associated with either hand switch.

Each MSIV bypass valve is normally closed and is required to remain closed for PFSSD. Two (2) redundant solenoid valves (one on each train) are installed on the air supply line and control air to the pneumatic actuator. The valves are normally closed with the solenoid valves de-energized. Actuation of either hand switch ABHS0079 or ABHS0080 will de-energize power to the solenoids to ensure they remain closed.

Cables associated with the 4 separation group 4 solenoids associated with each bypass valve are run in area A-16 North and South. Cables associated with the 4 separation group 1 solenoids associated with each bypass valve are unaffected by a fire in area A-16 North and South. Therefore, hand switch ABHS0080 is available to close the MSIV bypass valves.

Based on the above discussion, hand switch ABHS0080 is available to close the MSIVs and MSIV bypass valves in the event of a fire in area A-16.

References: E-15000, XX-E-013, E-13AB23A, E-13AB23B, E-13AB26, E-13AB27, E-13AB28, E-13AB29, E-1F9101, M-12AB02

5.2.3 Condensate Storage Tank

The preferred suction source for auxiliary feedwater (AFW) is the condensate storage tank (CST). This tank provides a clean source of water to the steam generators. On low auxiliary feedwater suction pressure (LSP), the suction source transfers to essential service water (ESW).

Three pressure transmitters are installed on the suction piping from the CST to the AFW pumps. These transmitters monitor auxiliary feedwater suction pressure from the CST and automatically transfer the AFW suction to ESW upon low pressure on two out of three pressure transmitters.

Circuits for two of the three pressure transmitters (ALPT0038 and ALPT0039) run through area A-16 North. Damage to these circuits could cause a spurious LSP signal on two pressure transmitters and swap the auxiliary feedwater source to ESW. This is acceptable for PFSSD since the ESW system is a credited source of AFW.

Based on the above discussion, a spurious auxiliary feedwater swapover from CST to ESW could occur if a fire occurs in area A-16 North. A fire in area A-16 South will not affect the swapover function.

References: E-15000, XX-E-013, E-1F9202, E-13AL08, M-12AL01

5.2.4 Safety Injection and Containment Spray

Calculation XX-E-013, Appendix 1 (PFSSD Support Section) provides a detailed discussion about the potential PFSSD impact of a spurious safety injection signal (SIS) and spurious containment spray actuation signal (CSAS). This section discusses the specific PFSSD impact if a fire occurs in this area.

Cables associated with GNPT0935 are run in area A-16 North. Cables associated with GNPT0936 are run in the North and South sections of area A-16. Consequently, a fire in area A-16 North could cause a spurious SIS and CSAS due to high containment pressure. A fire in area A-16 South will not cause a spurious CSAS since circuits for only one containment pressure transmitter are located in area A-16 South.

Cables associated with Train B containment spray isolation valve ENHV0012 are run in area A-16. Damage to these cables could cause the valve to spuriously open. However, as described below, a spurious CSAS can be mitigated from the control room. Therefore, spurious opening of this valve will not adversely impact PFSSD.

Cables associated with BBPT0456 are run in the North and South sections of area A-16. Cables associated with BBPT0457 are run in area A-16 North. Cables associated with BBPT0458 are run in area A-16 South. Consequently, a fire in either area A-16 North or South could cause a spurious SIS due to low pressurizer pressure.

Cables associated with steam line pressure transmitters ABPT0515, ABPT0516, ABPT0525, ABPT0526, ABPT0535, ABPT0536, ABPT0545 and ABPT0546 are run in area A-16 North. Area A-16 South does not contain cables associated with any of the steam line pressure transmitters. Consequently, a fire in area A-16 North could cause a spurious SIS due to damage to cables associated with two out of three steam line pressure transmitters on each steam loop.

Based on the above discussion, a fire in A-16 North could cause a spurious SIS and CSAS while a fire in area A-16 South could cause a spurious SIS.

Fire in A-16 North

A spurious SIS starts the charging sequence which starts the CCPs and opens the BIT flowpath valves. For a fire in area A-16 North, the B Train BIT flowpath valves could be affected and may not open on a SIS. The A Train BIT flowpath valves are unaffected by a fire in A-16 North. The RWST to CCP valves are unaffected and would open on a SIS. Also, the CCP mini flow valves are unaffected and Train B CCW flow to the seal water heat exchanger is unaffected to ensure cooling of the recirc flow, RCP seal return and CCP oil cooler. Therefore, there will be sufficient suction, discharge and cooling flow to ensure the charging pumps are not affected by a spurious SIS caused by a fire in this area.

A start of the credited CCW system (Train B) will not adversely impact the system. The Train B ESW system is unaffected and will start on a spurious SIS, providing necessary cooling water to the Train B CCW heat exchanger.

A start of the AFW pumps will not adversely impact PFSSD. The Train A AFW pump is credited for a fire in this area. Suction from the CST to the Train A AFW pump is unaffected. Discharge flow will either return to the CST or flow to the steam generators through the discharge control valves. Therefore, the Train A AFW pump is unaffected by a spurious SIS caused by a fire in area A-16 North.

A start of the RHR pumps due to a spurious SIS could adversely impact the A Train pump but the B Train pump is unaffected. The RWST supply to the pumps is not affected and the recirculation valves will remain in the open position. Train A CCW could be affected, preventing cooling to the Train A RHR heat exchanger. This could cause the Train A RHR pump to overheat while running on recirculation flow. Train B CCW is unaffected and is available to supply cooling water to the Train B RHR heat exchanger. Therefore, the Train B RHR pump will not be affected by a spurious SIS caused by a fire in area A-16 North.

A spurious CSAS could occur if a fire occurs in area A-16 North. If this occurs, operators can stop the CS pumps by placing pump control hand switches ENHIS0003 and ENHIS0009 in pull-to-lock. These switches are located on control room panel RL017.

Based on the above discussion, a spurious SIS and CSAS can occur if a fire occurs in this area. Credited PFSSD equipment will not be damaged by the spurious SIS. The CSAS can be terminated from the control room. Therefore, a spurious SIS and CSAS will not adversely impact PFSSD.

Fire in A-16 South

A spurious SIS starts the charging sequence which starts the CCPs and opens the BIT flowpath valves. For a fire in this area, the BIT flowpath valves are unaffected and would open on a SIS. The RWST to CCP valves are unaffected and would open on a SIS. Also, the CCP mini flow valves are unaffected and Train A CCW flow to the seal water heat exchanger is unaffected to ensure cooling of the recirc flow, RCP seal return and CCP oil cooler. Therefore, there will be sufficient suction, discharge and cooling flow to ensure the charging pumps are not affected by a spurious SIS caused by a fire in this area.

A start of the credited CCW system (Train A) will not adversely impact the system. The Train A ESW system is unaffected and will start on a spurious SIS, providing necessary cooling water to the Train B CCW heat exchanger.

A start of the AFW pumps will not adversely impact PFSSD. The Train A AFW pump is credited for a fire in this area. Suction from the CST to the Train A AFW pump is unaffected. Discharge flow will either return to the CST or flow to the steam generators through the

discharge control valves. Therefore, the Train A AFW pump is unaffected by a spurious SIS caused by a fire in area A-16 South.

A start of the RHR pumps due to a spurious SIS could adversely impact the B Train pump but the A Train pump is unaffected. The RWST supply to the pumps is not affected and the recirculation valves will remain in the open position. Train B CCW could be affected, preventing cooling to the Train B RHR heat exchanger. This could cause the Train B RHR pump to overheat while running on recirculation flow. Train A CCW is unaffected and is available to supply cooling water to the Train A RHR heat exchanger. Therefore, the Train A RHR pump will not be affected by a spurious SIS caused by a fire in area A-16 South.

Based on the above discussion, a spurious SIS can occur if a fire occurs in this area. Credited PFSSD equipment will not be damaged by the spurious SIS. Therefore, a spurious SIS will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-1F9431, E-1F9433, E-13AB21, E-13BB16, E-13EM01, E-13EN01, E-13EN03, E-13GN05, M-12AB01, M-12BB02, M-12BN01, M-12EJ01, M-12EN01, M-12GN01, OFN KC-016

5.2.5 Steam Generator Atmospheric Relief Valves

Cables run in area A-16 associated with Steam Generator Atmospheric Relief Valves ABPV0002, ABPV0003 and ABPV0004 are evaluated in this section. Cables associated with Steam Generator Atmospheric Relief Valve ABPV0001 are not run in area A-16.

PFSSD requires at least two steam generator atmospheric relief valves (ARV) be controlled and the other two closed. The ARVs are normally closed and require air pressure to open. Each valve is controlled by a pressure transmitter input signal from a pressure transmitter installed on the outlet side of the steam generator. The relief valve opens when the pressure reaches a designated setpoint.

Because of the fail-close design of the valve, it is unlikely that spurious signals due to cable damage will cause the valves to open. In the unlikely event the valves open, air pressure can be removed by closing appropriate air and nitrogen supply valves to fail close the valves. These valves are not located in area A-16 and access to the valves can be gained without having to traverse area A-16.

Damage to the associated cables could prevent controlling two of the four ARVs from the control room. Local controllers ABFHC0002 and ABFHC0003, located in fire area A-23, can be used to control ARVs ABPV0002 and ABPV0003, respectively.

Based on the above discussion, manual actions exist to ensure a fire in area A-16 will not prevent the control of two Steam Generator Atmospheric Relief Valves and the closure of the remaining two. These are OMAs. Refer to E-1F9900 for details. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-1F9101, E-13AB20A, E-13AB20B, M-12AB01, M-12KA04, M-12KA05

5.2.6 Steam Generator Level Indication

The decay heat removal function for PFSSD requires the use of two RCS loops and two Steam Generators. Steam generator (SG) level indication is required to support this function. A fire anywhere in area A-16 uses MDAFW pump A, which is normally aligned to supply SGs B and C.

Cables 12AEI08GB, 12AEI12BB, 12AEI12CB, 13AEI08GB, 13AEI08HB, 13AEI08JB, 13AEI08KB run through area A-16 North (rooms 1406 and 1408). These cables are associated with SG level transmitters AELT0502 (SGB WR), AELT0552 (SGB NR), AELT0553 (SGC NR), AELT0503 (SGC WR), AELT0518 (SGA NR), AELT0528 (SGB NR) and AELT0538 (SGC NR), respectively. Consequently, these level transmitters may not be available if a fire occurs in area A-16 North.

Cables 14AEI08PB and 14AEI08QB run through area A-16 South (rooms 1402 and 1408). These cables are associated with SG level transmitters AELT0527 (SGB NR) and AELT0537 (SGC NR). Consequently, these level transmitters may not be available if a fire occurs in area A-16 South.

Cables 11AEI08BB and 11AEI08CB are associated with AELT0529 and AELT0539, respectively. These cables are not run in area A-16. Consequently, these level transmitters will be available to provide SG B and C level indication for a fire anywhere in area A-16.

Cable 14SBS16XA is associated with SG B Wide Range Level Indication on the RP118B panel. RP118B is only used for a Control Room fire and is not required for a fire in area A-16.

Steam Generator B and C level indication is assured for a fire in area A-16 by using narrow range level indicators AELI0529 and AELI0539. Alternatively, a fire in area A-16 North could use AELT0527 and AELT0537 because cables associated with these level transmitters are unaffected by a fire in area A-16 North. A fire in area A-16 South could use AELT0502, AELT0528, AELT0552, AELT0503 and AELT0538 because cables associated with these level transmitters are unaffected by a fire in area A-16 South.

Other PFSSD cables run through area A-16 associated with Steam Generator level indication are listed in Table A-16-5. Damage to these cables will not impact PFSSD because SG B and C level indication is assured.

Steam generator B and C level indication is assured if a fire occurs in area A-16.

References: E-15000, XX-E-013, E-1F9203, E-13AE08, E-13AE12, M-12AE02

5.2.7 Non-Class 1E 120 VAC Electrical Distribution System

Cable 14PNG01AE supplies 480 VAC power from NG002BBF1 to 480/120V transformer XPN08A. Damage to this cable due to a fire in area A-16 South will result in a loss of power to the transformer and loss of 120 VAC feed to PN08 from this power source. A fire in area A-16 North will not affect this cable.

The PFSSD function of the Non-Class 1E 120 VAC electrical distribution system is to supply 120 VAC power to Main Control Boards RL017/RL018 and RL021/RL022. The power is split at each MCB to supply specific PFSSD components.

The PFSSD components that depend on 120 VAC power from RL017/RL018 are Residual Heat Removal (RHR) discharge valves EJHCV0606 (Train A) and EJHCV0607 (Train B). Non-class 1E switchboard panel PN07 supplies power from switch PN0736 to valve positioner EJHY0606. Valve positioner EJHY0606 controls the position of EJHCV0606 using hand

controller EJHIC0606. Non-class 1E switchboard panel PN08 supplies power from switch PN0833 to valve positioner EJHY0607. Valve positioner EJHY0607 controls the position of EJHCV0607 using hand controller EJHIC0607.

The PFSSD components that depend on 120 VAC power from RL021/RL022 are temperature recorders BBTR0423, BBTR0433 and BBTR0443. Non-class 1E switchboard panel PN07 supplies power from switch PN0738 to temperature recorder BBTR0423. Non-class 1E switchboard panel PN08 supplies power from switch PN0835 to temperature recorders BBTR0433 and BBTR0443.

The redundant source of power to PN08 from PG20GER5 is unaffected by a fire in area A-16. Therefore, PN08 is available to supply its PFSSD loads if a fire occurs in fire area A-16. In addition, PN07 is unaffected by a fire in area A-16 and remains available to supply its respective PFSSD loads.

References: E-15000, XX-E-013, E-1F9421, E-13PN01

5.2.8 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B. Cables run in fire area A-16 associated with these monitors are listed in Table A-16-5.

Cables for SENE0031 run in area A-16 North. A fire in area A-16 South will not affect cables associated with SENE0031 due to at least 20 feet of horizontal separation with no intervening combustibles. In addition, automatic suppression and detection is installed in the area. This configuration meets the separation requirements of 10CFR50, Appendix R Section III.G.2.b.

Cables for SENE0032 run in areas A-16 North and South. Therefore, SENE0032 is not available for a fire in area A-16.

Cables for SENY0060A & B run in area A-16 North. A fire in area A-16 South will not affect cables associated with SENY0060A & B due to at least 20 feet of horizontal separation with no intervening combustibles. In addition, automatic suppression and detection is installed in the area. This configuration meets the separation requirements of 10CFR50, Appendix R Section III.G.2.b.

Cable 14SES07BB is an indication circuit associated with SR monitor SENY0061A/B used for alternate PFSSD at remote shutdown panel RP118B. This cable is run in area A-16 North. A fire in this area does not use remote shutdown panel RP118B. Damage to this cable will not impact SR indication in the control room at panel RL020. Therefore, SR monitoring is available for a fire in area A-16 North using SENY061A/B.

A fire in area A-16 South can use SENE0031, SENY0060A/B, or SENY0061A/B.

For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013, Attachment 3.

References: E-15000, XX-E-013, E-13SE01, E-13SE02, E-13SE07, E-13SR14, E-1R1423B

5.2.9 Reactor Coolant System (RCS) Temperature Indication

PFSSD requires RCS temperature indication to be available. Cables associated with RCS Loop 2 cold leg wide range temperature indicator BBTI0423X and RCS loop 4 hot leg wide range temperature indicator BBTI0443A are run through fire area A-16. These cables are listed in Table A-16-5.

These components are located on the Auxiliary Shutdown Panel (RP118B) and are used for alternate shutdown in the event of a control room fire. Consequently, they are not required for a fire in area A-16. Damage to these cables will not affect RCS temperature indication in the control room.

References: E-15000, XX-E-013, E-13SB16

5.2.10 Reactor Head Vent Valves

PFSSD requires that one of the two reactor vessel head vent valves on each flow path (2 flow paths total) be closed to prevent uncontrolled depressurization of the RCS. Circuits for three of the four head vent valves run through area A-16. These cables are listed in Table A-16-5.

Cables for head vent valve BBHV8001A are not run through A-16 and are unaffected by a fire in A-16. Therefore, the cables for redundant head vent valve BBHV8002A can be damaged without any consequences on PFSSD.

Either BBHV8001B or BBHV8002B needs to be closed to prevent RCS depressurization through the separation group 4 head vent flow path. The separation requirements of 10CFR50, Appendix R are not satisfied for valves BBHV8001B and BBHV8002B. Less than 20 feet of horizontal separation exists between raceways carrying cables 14BBK30BA and 14BBK30DA.

Cable 14BBK30BA is run in conduit through area A-16. This conduit carries one other cable (14BGK48AB) which is a control cable for excess letdown isolation valve BGHV8153B and is normally de-energized. Therefore, the possibility of an inter-cable hot short that would cause valve BBHV8001B to open is not credible. An intra-cable short in cable 14BBK30BA would not cause the valve to open because this failure mode would not energize the control solenoid. Considering a ground fault equivalent hot short (GFEHS), a short to ground involving conductor 2 in cable 14BBK30BA coincident with a short to ground involving another +125 VDC conductor in another cable supplied from the same power source could open the head vent valve. This hot short has to occur prior to an intra-cable short occurring between conductors 2 and N2 in the associated cable because an intra-cable short between these conductors coincident with a GFEHS will open the circuit protective device and de-energize the control solenoid. Fire testing (NUREG/CR-7100) has shown that intra-cable shorting in thermoset cables occurs before inter-cable or GFEHS shorting. Therefore, there is reasonable assurance that inter-cable or GFEHS shorts will not cause two valves to open if a fire occurs in this area.

Based on the above discussion, there is reasonable assurance that cable damage, along with any combination of cable failures, will not cause two series valves in the head vent flow path to spuriously open in the event of a fire in area A-16.

References: E-15000, XX-E-013, E-1F9301, E-13BB30, E-1R1413D, E-1R1423A, E-1R1423C, E-1R1433A, E-1R1433B, M-12BB04

5.2.11 Reactor Coolant Pump Seal Injection

PFSSD requires RCP seal injection to provide a boron injection path, provide makeup to the RCS and provide cooling to the RCP seals. The redundant boron injection and makeup path is through the boron injection tank (BIT). The redundant seal cooling method uses thermal barrrier cooling. Boron injection tank flowpath availability is discussed in Section 5.2.26. Thermal barrier cooling is discussed in Section 5.2.24.

Cables 14BBG04AA, 14BBG04AB, 14BBG04BA, 14BBG04BB, 14BBG04CA, 14BBG04CB, 14BBG04DA and 14BBG04DB associated with RCP seal injection valves BBHV8351A, BBHV8351B, BBHV8351C and BBHV8351D are located in area A-16 South. Cables associated with these valves are not run in area A-16 North. The RCP seal injection valves are not high-low pressure interface valves, so consideration of a 3-phase proper polarity hot short is not required. A hot short, open circuit or short to ground involving these cables will not cause the valves to close. Therefore, RCP seal injection valves BBHV8351A, BBHV8351B, BBHV8351C and BBHV8351D will remain in their normally open position if a fire occurs anywhere in this area. Furthermore, the valves are de-energized so cable damage could not cause the valves to close.

Cable 14BGI51BA is associated with RCP seal total flow indicator BGFT0215B. Damage to this cable due to a fire in area A-16 South could prevent operation of the flow transmitter and could prevent operators from determining total RCP seal injection flow using flow indicator BGFI0215B. Flow indicator BGFI0215A is unaffected by a fire in area A-16 South and can be used by operators to determine if seal injection flow is functioning. Flow indicators BGFI0215A and BGFI0215B are unaffected by a fire in area A-16 North.

Based on the above discussion, RCP seal injection is available in the event of a fire in area A-16. Loss of the operating charging pump would be indicated by loss of flow to the RCP seals using flow indicator BGFI0215A if the fire is in A-16 North or South and BGFI0215B if the fire is in A-16 North.

References: E-15000, XX-E-013, E-13BB04, E-13BG51, E-1F9102, M-12BB03

5.2.12 Pressurizer Level Transmitters

PFSSD requires pressurizer level indication to be available. Pressurizer level indication is provided by level transmitters BBLT0459 and BBLT0460. Circuits for BBLT0459/BBLI0459A do not run through fire area A-16 and are unaffected by a fire in A-16. Cables for BBLT0460, that run through A-16 are summarized in Table A-16-5.

Pressurizer level indication is available for a fire in area A-16 using BBLT0459/BBLI0459A.

References: E-15000, E-1F9301, E-13BB16

5.2.13 Reactor Coolant System (RCS) Pressure Indication

The PFSSD design requires RCS pressure indication to be available. RCS pressure indication is provided in the control room using BBPI0405 or BBPI0406 on RL022.

Cable 14BBI16BA associated with BBPT0406 is run in fire area A-16 South. Cables associated with BBPT0405 and BBPT0406 are unaffected by a fire in area A-16 North.

Based on the above discussion, RCS pressure indication is available in the control room using BBPI0405 if a fire occurs in area A-16 South and both BBPI0405 and BBPI0406 if the fire is in A-16 North.

References: E-15000, XX-E-013, E-1F9201, E-13BB15, E-13BB16, M-12BB04

5.2.14 Residual Heat Removal (RHR)

Cold shutdown mode of PFSSD requires RHR taking suction from the RCS. RHR pump suction from the RCS is controlled by valves BBPV8702A and EJHV8701A (Train A) and BBPV8702B and EJHV8701B (Train B).

A fire in area A-16 North will cause a loss of Train A CCW and the inability to operate Train A RHR. Therefore, Train B RHR is required for a fire in area A-16 North.

A fire in area A-16 South will cause a loss of Train B CCW and the inability to operate Train B RHR. Therefore, Train A RHR is required for a fire in area A-16 South.

Damage to any of the cables associated with BBPV8702A and BBPV8702B could prevent opening the associated valve from the control room. Damage to cable 12BBI15NB associated with pressure transmitter BBPT0403 could send a false High-1 RCS pressure signal and open the contacts on relay K734 which would prevent remote opening of valves BBPV8702A and BBPV8702B. Since cable 12BBI15NB runs in the North and South sections, a fire anywhere in area A-16 would require a cold shutdown repair to be made within 72 hours per 10CFR50, Appendix R or a containment entry to manually open BBPV8702A or BBPV8702B.

The RHR heat exchanger discharge control valve on the operating train (EJHCV0606 (Train A) or EJHCV0607 (Train B)) needs to be available. Cable 16EJI12BA, which is associated with EJHCV0607, runs through area A-16 South. Damage to cable 16EJI12BA will result in the loss of control of valve EJHCV0607. Cables associated with valve EJHCV0606 run through a different fire area and are unaffected by a fire in area A-16. Therefore, Train A RHR heat exchanger outlet valve is available for a fire anywhere in area A-16 and Train B RHR heat exchanger outlet valve is available for a fire in area A-16 North.

The RHR pump discharge to RCS cold leg isolation valve (EJHV8809A or EJHV8809B) needs to be open on the operating train. Damage to cables 14EJG09BC and 14EJG09BD would likely result in valve EJHV8809B remaining in its as-is normally open position, which is the preferred PFSSD position. However, two proper intra-cable hot shorts in cable 14EJG09BD or one intra-cable hot short in cable 14EJG09BD combined with a short to ground on conductor U1 would spuriously close the valve. Cables for valve EJHV8809A are run in a separate fire area and are unaffected by a fire in area A-16. Therefore, Train A and Train B RHR pump discharge to RCS cold leg flow path is available for a fire anywhere in area A-16.

Based on the above discussion, the Train A RHR system is unaffected by a fire in area A-16 South and Train B RHR system is unaffected by a fire in area A-16 North. However, a cold shutdown repair or containment entry may be required to open BBPV8702A or BBPV8702B prior to initiating shutdown cooling.

References: E-15000, XX-E-013, E-1F9205, E-13BB12A, E-13BB12B, E-13EJ09C, E-13EJ12, M-12BB01, M-12EJ01, M-12EP01

5.2.15 RCS Hot and Cold Leg Temperature Elements

PFSSD requires RCS hot and cold leg temperature indication on at least one loop to verify flow through the steam generators. The temperature elements used for this purpose are listed in Table A-16-6.

The four cables associated with RCS temperature indication listed in Table A-16-5 run in the same raceway through the north and south portions of fire area A-16. A fire in either section could damage these cables and cause temperature indication on these four temperature

elements (BBTE0413B, BBTE0423B, BBTE0433A and BBTE0443A) to be unavailable. Consequently, temperature indication on at least one leg on each loop could be lost, which is not in accordance with the PFSSD methodology at Wolf Creek.

Table A-16-6
RCS Hot and Cold Leg Temperature Elements Used for PFSSD

COMPONENT	FUNCTION
BBTE0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	RCS Cold Leg Temperature Element (WR) Loop 4

EMG ES-04 provides alternate indication that may be used. One of these methods verifies that steam generator pressure is stable or decreasing. S/G “B” and S/G “C” pressure instruments ABPT524 and ABPT534 are unaffected by a fire in A-16 and can be used per EMG ES-04 to verify heat removal in loops 2 and 3.

The configuration is acceptable because, in the event of fire in fire area A-16, cooldown will be performed using RCS loops 2 and 3. RCS wide range hot and cold leg temperature elements (BBTE423A and BBTE433B) and ABPT524 and ABPT534 will provide indication.

References: E-15000, XX-E-013, E-1F9201, E-13BB15, M-12AB01, M-12BB01

5.2.16 Steam Generator Main Feedwater Isolation Valves

PFSSD requires that either the main feedwater isolation valves (MFIVs) be closed or the main feedwater pumps be stopped to prevent overfilling the steam generators. Flow diversion from auxiliary feedwater (AFW) to the main feedwater system piping is prevented by check valves AEV0420, AEV0421, AEV0422 and AEV0423. Closure of the main feedwater isolation valves is not required to prevent AFW flow diversion.

Each MFIV is designed to utilize system fluid (feedwater) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main feedwater. This is done by actuating either all close hand switch AEHS0080 (separation group 1) or AEHS0081 (separation group 4) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MFIV	AEHS0080 (Sep Group 1)		AEHS0081 (Sep Group 4)	
	Solenoids	Cable	Solenoids	Cable
AEFV0039	MV1, MV3, MV5	11AEK16AH	MV2, MV4, MV6	14AEK17AH
AEFV0040	MV1, MV3, MV5	11AEK17AH	MV2, MV4, MV6	14AEK16AH
AEFV0041	MV1, MV3, MV5	11AEK16BH	MV2, MV4, MV6	14AEK17BH
AEFV0042	MV1, MV3, MV5	11AEK17BH	MV2, MV4, MV6	14AEK16BH

All 4 cables associated with the 12 separation group 4 solenoid valves are run in area A-16 North. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 1 cables associated with hand switch AEHS0080 are unaffected by a fire in area A-16 North. Therefore, hand switch AEHS0080 is available to close the four MFIVs if a fire occurs in area A-16 North. Fire area A-16 South contains no cables associated wih the MFIVs. Therefore, either hand switch can be used to close the MFIVs in the event of a fire in area A-16 South.

Based on the above discussion, MFIV isolation is assured using hand switch AEHS0080 if a fire occurs in area A-16 North and hand switches AEHS0080 or AEHS0081 if a fire occurs in area A-16 South..

References: E-15000, XX-E-013, E-13AE14, E-13AE15, E-13AE16, E-13AE17, E-1F9201, M-12AE02

5.2.17 Charging Flow to Regenerative Heat Exchanger Isolation Valves

PFSSD requires charging flow to be directed to the RCP seals. To ensure adequate flow to the RCP seals, flow diversion to the regenerative heat exchanger needs to be prevented. Valves BGHV8105 and BGHV8106 are included in the PFSSD equipment list to accomplish this task. Manual valve BG8402B is also included to provide an alternate means of closing this flow path during alternate safe shutdown using OFN RP-017.

Cables associated with BGHV8105 are run in area A-16 North and could be damaged by a fire in this area, preventing valve BGHV8105 from being closed from the control room. However, cables associated with valve BGHV8106, and its hand switch (BGHIS8106), are unaffected by a fire in area A-16. Therefore, valve BGHV8106 can be used to isolate flow to the regenerative heat exchanger and therefore satisfy the PFSSD requirement.

References: E-15000, XX-E-013, E-1F9102, E-13BG11A, M-12BG03

5.2.18 Excess Letdown

PFSSD requires the excess letdown path be isolated to prevent uncontrolled depressurization of the RCS. To accomplish this, either normally closed valve BGHV8153A or BGHV8154A must be maintained closed and either normally closed valve BGHV8153B or BGHV8154B must be maintained closed. Cables associated with these valves are listed in Table A-16-5.

Circuits for BGHV8154A do not run through fire area A-16 and are unaffected by a fire in this area. Therefore, this valve remains closed.

The separation requirements of 10CFR50, Appendix R are not satisfied for valves BGHV8153B and BGHV8154B. Less than 20 feet of horizontal separation exists between raceways carrying cables 14BGK48AB and 14BGK48BB.

Cable 14BGK48AB is run in conduit through area A-16. This conduit carries one other cable (14BBK30BA) which is a control cable for RCS head vent valve BBHV8001B and is normally

de-energized. Therefore, a hot short that would cause valve BGHV8153B to open is not credible.

An intra-cable short in cable 14BGK48AB would not cause the valve to open because this failure mode would not energize the solenoid.

Based on this discussion, there is reasonable assurance that valve BGHV8153B will not spuriously open in the event of a fire in area A-16.

References: E-15000, XX-E-013, E-1F9301, E-13BG48, E-1R1413D, E-1R1423A, E-1R1423C, E-1R1433A, E-1R1433B, M-12BG01

5.2.19 Volume Control Tank (VCT) Discharge Valves

PFSSD requires isolation of the Volume Control Tank (VCT) discharge to charging pumps suction. Either valve BGLCVC0112B or BGLCV0112C needs to be closed. Cables run in area A-16 associated with valve BGLCV0112C are listed in Table A-16-5.

Damage to cables 14BGG12BA and 14BGG12BB will prevent closing valve BGLCV0112C from the control room. These cables are run in area A-16 North. Therefore, valve BGLCV0112C is unavailable due to a fire in area A-16 North.

Cable 14BGI51DA is an instrumentation cable for VCT level transmitter BGLT0185. This cable runs in area A-16 North. Damage to this cable could send a false VCT low-low level signal and close relay K647 on the close circuit for valve BGLCV0112C. This would fail the valve closed if all other permissives are met, which is the desired PFSSD position. In addition, valve BGLCV0112B is unaffected by a fire in this area. Therefore, damage to cable 14BGI51DA will have no adverse impact on the ability to isolate the VCT discharge flow path.

Power and control cables for BGLCV0112B are run in a separate fire area and are unaffected by a fire in area A-16. Therefore, valve BGLCV0112B is available for a fire anywhere in area A-16 and both valves BGLCV0112B and BGLCV0112C are available for a fire in area A-16 South.

References: E-15000, XX-E-013, E-1F9102, E-13BG12, E-13BG12A, E-13BG51, M-12BG03

5.2.20 Steam Generator Blowdown to Blowdown Flash Tank Isolation Valves

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown. Cables run in area A-16 associated with these valves are listed in Table A-16-5.

Damage to cable 14RPK09AA could cause a loss of power to auxiliary relays 3XBM9, 3XBM10, 3XBM11 and 3XBM12, located in panel RP210, which will fail close valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004, respectively.

An open circuit on cables 14BMK06AA, 14BMK06AC, 14BMK06BA, 14BMK06BC, 14BMK06CA, 14BMK06CC, 14BMK06DA or 14BMK06DC will fail the valves closed, which is the desired PFSSD position. A hot short on these cables could prevent the valves from being closed using hand switches BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A.

Redundant means for closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 are available and are unaffected by a fire in area A-16. This redundant means uses BMHIS0001C,

BMHIS0002C, BMHIS0003C and BMHIS0004C, located on the BM157 panel in the radwaste control room. Access to the radwaste control room can be gained from outside fire area A-16.

A fire in area A-16 will not prevent closing steam generator blowdown valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004.

Thermal hydraulic analysis WCNOC-CP-002 shows insignificant impact on SG inventory even with all four blowdown valves open. Therefore, no E-1F9900 OMA is required to close blowdown valves to achieve and maintain hot standby. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 34.

References: E-15000, XX-E-013, E-1F9101, E-13BM06A, E-13BM06D, M-12BM01

5.2.21 Refueling Water Storage Tank (RWST) and Containment Sump Isolation Valves

To prevent draindown of the RWST into the containment sump, PFSSD requires that either valve BNHV8812A or valve EJHV8811A and valve BNHV8812B or valve EJHV8811B be closed during hot standby. For cold shutdown, the operating train containment sump valve (EJHV8811A or EJHV8811B) must be closed to prevent flow diversion from the RCS to the containment sump. Valves BNHV8812A and BNHV8812B are normally open and valves EJHV8811A and EJHV8811B are normally closed.

PFSSD cables for valves BNHV8812A and BNHV8812B do not run through fire area A-16. If valve EJHV8811A or EJHV8811B were to spuriously open, valves BNHV8812A and BNHV8812B can be closed from the control room.

Cables for valve EJHV8811A do not run through fire area A-16. A spurious SIS is possible for a fire in area A-16 North or South, as discussed previously. However, only one RWST level transmitter could be affected by a fire in area A-16, so a spurious SIS coincident with a spurious low-low RWST level is not credible for a fire in area A-16 and valve EJHV8811A will not spuriously open due to a fire in area A-16.

Cables associated with EJHV8811B are run in area A-16 South. A fire in this area could damage these cables and cause valve EJHV8811B to spuriously open. If this occurs, valve BNHV8812B can be closed from the control room using BNHIS8812B.

RWST level indicators BNLI0930, BNLI0931 and BNLI0932 are unaffected by a fire in area A-16 South and will provide RWST level indication in the control room. If the RWST is losing inventory faster than expected, valves BNHV8812A and BNHV8812B can be closed from the control room.

Although valve EJHV8811B could spuriously open due to a fire in area A-16 South, valve BNHV8812B is unaffected and can be closed from the control room. Therefore, draindown of the RWST to the containment sump can be mitigated from the control room using BNHIS8812B. RWST level transmitters BNLI0930, BNLI0931 and BNLI0932 are available to diagnose the reducing RWST level if this occurs.

References: E-15000, XX-E-013, E-1F9205, E-13BN07, E-13EJ06A, E-13EJ06B, M-12BN01, M-12EJ01, E-1R1413B, E-1R1413D, E-1R1423A, E-1R1423B, E-1R1423D, E-1R1433A, E-1R1433B, M-10BN

5.2.22 Auxiliary Feedwater Pump Room Coolers

Cables associated with the Auxiliary Feedwater Pump B (AFPB) room cooler (SGF02B) are discussed in this section. Cables 14GFG01BA and 14GFG01BB are power and control cables, respectively, associated with SGF02B and run in area A-16 North. Damage to these cables will cause Auxiliary Feedwater Pump B room cooler motor DSGF02B to be inoperable. Consequently, AFPB is inoperable due to a fire in area A-16 North.

Cables associated with the Auxiliary Feedwater Pump A (AFPA) room cooler (SGF02A) are run in a different fire area and are unaffected by a fire anywhere in area A-16. Auxiliary Feedwater Pump A and associated room cooler is unaffected by a fire in area A-16. Therefore, the AFW Pump A flow path is available if a fire occurs in area A-16.

References: E-15000, XX-E-013, E-13GF01

5.2.23 Containment Coolers

PFSSD requires containment cooling to maintain the containment environment within EQ limits. Cables associated with Train B containment coolers are run in areas A-16 South and A-16 North. These circuits are listed in Table A-16-5.

Damage to these cables could prevent operation of the Train B containment coolers if a fire occurs in areas A-16 South or A-16 North. However, circuits for the Train A containment coolers are run in a separate fire area and are unaffected by a fire anywhere in area A-16. Power to the Train A containment coolers is available in the event of a fire in A-16, as discussed in Section 5.2.29. Train A ESW is unaffected by a fire in area A-16.

Based on the above discussion, the Train A containment coolers are available in the event of a fire in area A-16.

References: E-15000, XX-E-013, E-1F9441, E-13EF07, E-13EF08, E-13EF09, E-13GN02, E-13GN02A, E-03NG01, M-12EF02

5.2.24 Thermal Barrier Cooling

The Wolf Creek plant design provides two redundant methods of cooling the RCP seals, thermal barrier cooling (TBC) and RCP seal injection. The PFSSD methodology at Wolf Creek requires tripping the RCPs and performing a natural circulation cooldown upon loss of both TBC and RCP seal injection. If only one method is lost, continued operation of the RCP is allowed by present established procedures. In addition, as long as at least one seal cooling method (seal injection or thermal barrier cooling) is available and is unaffected by the fire, the CCW system can remain lined-up to the RCP thermal barriers with no adverse impact on PFSSD. However, if both methods are lost, it may be necessary to close the CCW return valves from the thermal barriers to prevent a water hammer in the CCW system.

A fire in area A-16 North may cause a loss of Train A CCW. If the Train B CCW system is operating at the time of the fire, then all components will be in their proper lineup and loss of TBC will not occur. If the Train A CCW system is operating at the time of the fire, operators may need to swap to Train B CCW to re-establish TBC. The swapover can be performed from the control room.

Cable 14EGI15AA is associated with flow transmitter EGFT0062 and runs in A-16 North. The flow transmitter monitors CCW outlet flow from the thermal barriers and automatically shuts valve EGHV0062 on a high flow signal. A fire could damage the cable, causing a spurious high flow signal and close the valve. If this occurs, CCW flow to the thermal barriers would be lost until operators open bypass valve EGHV0132 from the control room.

Cable 14EGI19BB is associated with CCW to RCPs flow transmitter EGFT0129 and runs in A-16 North. Damage to this cable could prevent operators from diagnosing a loss of CCW flow to the RCP thermal barriers using flow indicator EGFI0129. CCW to RCP flow indicator EGFI0128 is unaffected by a fire in area A-16 North and can be used to diagnose a loss of CCW flow to the RCP thermal barriers.

A fire in area A-16 South may cause a loss of Train B CCW. If the Train A CCW system is operating at the time of the fire, then all components will be in their proper lineup and loss of TBC will not occur. If the Train B CCW system is operating at the time of the fire, TBC may not be available because EGHV0053 will be in the closed position. A fire in area A-16 South could prevent operation of EGHV0053, which supplies CCW to the service loop, including the RCP thermal barriers. Therefore, a fire in area A-16 South could result in a loss of thermal barrier cooling. This is discussed in more detail in Section 5.1.14.

A fire in A-16 South can also cause the spurious closure of EGHV0062 due to damage to cables 14EGG10AC or 14EGG10AD. If this occurs, CCW flow to the thermal barriers would be lost until operators open bypass valve EGHV0132 from the control room.

If the fire is in area A-16 South, CCW to RCP flow indicators EGFI0128 and EGFI0129 are available to diagnose a loss of CCW flow to the RCP thermal barriers.

Based on the above discussion, thermal barrier cooling could be lost if a fire occurs in areas A-16 North or A-16 South. If the fire is in A-16 North, thermal barrier cooling can be restored from the control room. If the fire is in A-16 South, thermal barrier cooling may not be restorable from the control room. In both cases, RCP seal injection is available using the unaffected charging train as discussed in Section 5.2.11.

References: E-15000, XX-E-013, E-13EG09, E-13EG10, E-13EG15, E-13EG18, E-13EG19, E-1F9303, M-12EG03

5.2.25 RHR to RCS Hot Leg Loops 2 & 3 Isolation Valve

The cold shutdown mode of PFSSD requires isolation of hot leg recirculation. Valve EJHV8840 is used to isolate RHR flow to the RCS hot leg loops 2 and 3. This valve is normally closed and is required to be closed for cold shutdown. During hot standby, the valve can be in any position.

Cables associated with valve EJHV8840 run through area A-16. Damage to cables 14EJG09AC and 14EJG09AD would likely result in valve EJHV8840 remaining in its as-is normally closed position, which is the preferred PFSSD position. However, two proper intra-cable hot shorts in cable 14EJG09AD or one intra-cable hot short in cable 14EJG09AD combined with a short to ground on conductor U1 would spuriously open the valve.

As stated above, the position valve EJHV8840 (open or closed) will not affect hot standby. The valve needs to be closed for cold shutdown. The valve has been modified to address NRC IN 92-18 and can be closed manually prior to entering shutdown cooling mode. The torque and limit switches are not bypassed by postulated damage to these cables.

Based on the above discussion, valve EJHV8840 could spuriously open in the event of a fire in this area. This will not affect hot standby, however the valve will need to be locally closed prior to entering shutdown cooling mode.

References: E-15000, XX-E-013, E-1F9205, E-13EJ09C, M-12EJ01

5.2.26 Boron Injection Tank Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

A fire in area A-16 does not affect letdown isolation valves BGLCV0459 and BGLCV0460. Also, excess letdown flow path isolation is unaffected by a fire in area A-16. Therefore, the BIT flowpath is not required to maintain hot standby but may be required for transition to cold shutdown.

Damage to cables 14EMG02BA or 14EMG02BB will prevent opening valve EMHV8803B from the control room. These cables run in area A-16 North. A fire in this area will damage cables associated with the A Train CCW and prevent supplying cooling water to the A CCP. Therefore, the B CCP is used for a fire in area A-16 North.

Cables 14EMG02DA and 14EMG02DB, associated with BIT outlet valve EMHV8801B, could also be damaged by a fire in area A-16 North. Cables associated with redundant BIT outlet valve EMHV8801A are unaffected. Therefore, makeup through the BIT is available for transition from hot standby to cold shutdown.

A fire in area A-16 South requires CCP A to be used due to damage to CCW Train B. Circuits for valve EMHV8803A do not run through area A-16 North or South and makeup through the BIT, using CCP A, is available if a fire occurs in area A-16 South.

Based on the above discussion, the BIT flowpath is available if a fire occurs in area A-16 South but may not be available if the fire is in A-16 North.

References: E-15000, XX-E-013, E-13EM02, E-13EM02B, M-12EM02, E-1F9302

5.2.27 Boron Injection Tank Flow Diversion

If charging flow through the BIT is used, flow diversion through the SIS test line should be avoided. Therefore, valves EMHV8843 and EMHV8882 need to be maintained closed. If either or both of these valves cannot be closed, then either valve EMHV8871 or EMHV8964 need to be closed.

Cables associated with EMHV8882 are not run in area A-16. Therefore, valve EMHV8882 is unaffected by a fire in A-16 and will not spuriously open.

Cable 14EMK04CA is a control cable for EMHV8843 run in area A-16 South. A +125 VDC external cable hot short in contact with conductor 2 in cable 14EMK04CA will energize the solenoid and open valve EMHV8843. The cable is run in raceways with cables carrying the proper voltage and polarity. The hot short would bypass the control room hand switch (EMHIS8843) on RL018 and control of this valve from the control room would be lost. Hand switch EMHS8843, located in room 1409, is unaffected by a fire in area A-16 and can be used to close valve EMHV8843 if this valve is unresponsive from the control room.

Cables for normally closed valve EMHV8964 are unaffected by a fire in area A-16. Consequently, valve EMHV8964 will remain closed and flow diversion through the SIS test line will be averted.

References: E-15000, XX-E-013, E-1F9302, E-13EM04, E-13EM04A, E-13EM05A, M-12EM02

5.2.28 Safety Injection Accumulator Isolation Valves

PFSSD requires isolation of the SI accumulators prior to reducing RCS pressure below the injection pressure to avoid unnecessary accumulator discharge. This is accomplished by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. These valves are normally open with the MCC breaker locked in the open position. Cables for valves EPHV8808B and EPHV8808D are run in area A-16 South and are listed in Table A-16-5.

Since the breakers for these valves are normally open, damage to these cables will not cause the valve to spuriously change position. However, damage to the cables will prevent closing the associated valve from the control room after power is restored.

The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig. If necessary, a containment entry can be made to manually close the valves.

A fire in area A-16 South may require a containment entry to close valves EPHV8808B and EPHV8808D if these valves are unresponsive from the control room.

References: E-15000, XX-E-013, E-13EP02A, M-12EP01

5.2.29 PFSSD Equipment Power Availability

PFSSD requires that one train of electrical systems required to power PFSSD components be available and be unaffected by a fire. Cable 14NBB14AD is a control cable for relay 62TDENB02 and is run in area A-16 South. Damage to this cable could cause a spurious degraded voltage signal which could result in a loss of off-site power to bus NB02. A fire in area A-16 North will not affect this cable due to separation in accordance with 10CFR50, Appendix R Section III.G.2.b. Therefore, Train B PFSSD equipment powered from bus NB02 is available if a fire occurs in area A-16 North. A fire in area A-16 South uses Train A equipment. Train A bus NB01 is unaffected by a fire in area A-16. As discussed in Section 5.2.33, the Train B EDG fuel oil transfer pump could be affected by a fire in area A-16 North, preventing transfer of fuel from the underground storage tank to the day tank. Therefore, the Train B Emergency Diesel Generator may not be available to power NB02 if a fire occurs in area A-16 North.

Cables 14NGG01AD and 14NGG01AE are power cables that supply power to 480 VAC MCC NG02B and are run in area A-16 South. Damage to these cables could cause a loss of power to 480 VAC MCC NG02B. A fire in area A-16 North will not affect these cables due to separation in accordance with 10CFR50, Appendix R Section III.G.2.b. Therefore, Train B PFSSD equipment powered from 480 VAC MCC NG02B is available if a fire occurs in area A-16 North. A fire in area A-16 South uses Train A equipment. Train A 480 VAC MCC NG01B is unaffected by a fire in area A-16 South.

Based on this discussion, a fire in area A-16 will not disrupt power to required PFSSD components.

References: E-15000, XX-E-013, E-1F9426, E-13NB14

5.2.30 Control Room Lock-Out Relays

Cables associated with control room lockout relays 86XRP5, 86XRP6 and 86XRP7 are run in area A-16. Equipment controlled by the relays is identified in the table below.

Relay #	Description
86XRP5	Train B MDAFP from CST and ESW Supply Valves (ALHV0034 and ALHV0030)
86XRP6	ESW to TDAFP Supply Valve (ALHV0033)
86XRP7	Train B MDAFP (PAL01B)

Damage to these cables could prevent operation of associated equipment. Train A equipment, located in a separate fire area, is available and is unaffected by the fire.

References: XX-E-013, E-15000, E-13AL01B, E-13AL02B, E-13AL04B, E-13RP12, E-13RP14, E-13RP15, E-093-00095, E-093-00096, E-1F9202, E-1F9204

5.2.31 Normal Pressurizer Spray

The normal pressurizer spray valves are included in the PFSSD design because spurious operation of pressurizer sprays can cause a decrease in pressure which can lead to boiling in the core. The pressurizer spray valves are part of the pressurizer pressure control system.

The pressurizer normal spray valves (BBPCV0455B and BBPCV0455C) operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

An instrument cable (12BBI16LB) associated with pressurizer pressure transmitter BBPT0456 is run in fire areas A-16 South and A-16 North. An instrument cable (13BBI16MB) associated with pressurizer pressure transmitter BBPT0457 is run in fire area A-16 North. An instrument cable (14BBI16NB) associated with pressurizer pressure transmitter BBPT0458 is run in fire area A-16 South. As discussed in Calculation XX-E-013, Appendix 1, the Ovation pressurizer pressure control system uses 4-channel verification from all four pressurizer pressure transmitters to operate the pressurizer spray valves. Failure of a single channel will not cause the spurious operation of the pressurizer spray valves since the system uses the 2nd highest input as the validated signal. Damage to two channels will not cause the spray valves to open because both channels would have to fail to the exact same value at the exact same time and therefore this failure mode is not credible, as discussed in XX-E-013.

Based on the above discussion, the pressurizer spray valves will not spuriously open if a fire occurs in this area.

References: E-15000, XX-E-013, E-13BB16, E-1F9304, M-744-00028, M-761A-00063, DCP 13324

5.2.32 Control Room Air Conditioning

Cable 14GKG02BE is a control cable associated with control room A/C unit SGK04B. Damage to this cable due to a fire could prevent operation of Train B Control Room A/C unit.

Circuits for Train A control room A/C unit SGK04A do not run through area A-16 and are unaffected by a fire. Therefore, control room air conditioning is available using SGK04A.

References: XX-E-013, E-15000, E-13GK02D, E-1F9442, M-12GK01, M-622.1A-00007

5.2.33 Emergency Diesel Fuel Oil Transfer Pump

Emergency diesel fuel oil transfer pumps are required to transfer fuel oil from the underground storage tank to the aboveground day tank to support operation of the emergency diesel generator (EDG). Loss of the fuel oil transfer pump on the associated train will prevent operation of the associated EDG.

Cable 14JEG01BD is run in fire area A-16 North. A short to ground on this cable will blow the control power fuse and prevent operation of the Train B EDG fuel oil transfer pump. The EDG can operate for approximately 1 hour fully loaded on the contents of the day tank.

A fire in area A-16 North credits Train B components using off-site power to NB02. Therefore, loss of the Train B EDG due to a fire in this area will not affect PFSSD.

References: XX-E-013, E-15000, E-13JE01A, E-1F9411B

5.2.34 Load Center Feeder Breakers PA0105 and PA0206

Load center feeder breakers PA0105 and PA0206 are credited for PFSSD because they supply power to credited non-safety related loads. Cables associated with these breakers run in this area. PFSSD impact due to damage to these cables is discussed below.

Cable 15PGA10AA is a control cable associated with breaker PA0105 and runs in fire area A-16 South. An intra-cable hot short in this cable will trip PA0105. Breaker PA0105 supplies power to the following PFSSD components:

- PG11JFR2 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0031
- PG11KBR3 – Auxiliary Steam System Control Valve FBHV0081

PG11JFR2 and PG11KBR3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using hand switch ABHS0079. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

The cable note in Setroute for cable 15PGA10AA states that the cable is located within a heat affected zone per M-663-00017A and requires further fire protection review if credited for PFSSD. The heat affected zone evaluation is discussed in M-663-00017A, Appendix B13, pages B-13-64 through B-13-69 and occurs where the cable passes between fire areas A-5 (Roomn 1119) and A-16 South (Room 1408). Since the cable traverses both fire areas and is not credited for a fire in either area, there will be no adverse impact on PFSSD if a fire occurs in areas A-5 or A-16 South.

Cable 16PGA10CA is a control cable associated with breaker PA0206 and runs in fire area A-16 South. An intra-cable hot short in this cable will trip PA0206. Breaker PA0206 supplies power to the following PFSSD components:

- PG12KAF4 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0032
- PG12KAF5 – Main Steam Supply to Steam Seals Valve ABHV0046
- PG12KEF3 – Auxiliary Steam System Control Valve FBHV0080

PG12KAF4, PG12KAF5 and PG12KEF3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using hand switch ABHS0079. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Based on the above discussion, loss of breakers PA0105 and PA0206 will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-13PG10, E-1F9424E

FIRE AREA A-17

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-17 is located on the 2026 elevation of the Auxiliary Building and includes the room listed in Table A-17-1.

Table A-17-1
Rooms Located in Fire Area A-17

ROOM #	DESCRIPTION
1409	South Electrical Penetration Room

Fire area A-17 is protected with an automatic Halon fire suppression system. In addition, automatic fire detection is installed throughout. The automatic suppression and detection system meets the requirements of 10CFR50, Appendix R, Section III.G.2.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-17-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-17-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-17

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17. All three steam generator pressure indicators on all four steam generators are available.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
AE	Main Feedwater	H, P	Steam generator level indication is available using AELI0501 (SGA WR), AELI0518 (SGA NR), AELI0551 (SGA NR), AELI0528 (SGB NR), AELI0529 (SGB NR), AELI0503 (SGC WR), AELI0538 (SGC NR), AELI0539 (SGC NR), AELI0548 (SGD NR) and AELI0554 (SGD NR)
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
BB	Reactor Coolant System	R, M, H, P, S	All PFSSD functions associated with the reactor coolant system are satisfied. Cables associated with all four RCP seal injection valves could be affected but the damage will not cause the valves to close. Therefore, seal injection remains available. A spurious CISB due to 2/4 high containment pressures will isolate the CCW to/from RCP valves, which will isolate thermal barrier cooling. This is acceptable since RCP seal injection remains available. Loss of inventory through the head vent valves could occur due to spurious opening of BBHV8001B and BBHV8002B. The Train A CCP is available to charge through the BIT. Pressurizer level indication is available using BBLI0459A. RCS wide range hot leg temperature element BBTE423A (Steam Generator B) and wide range cold leg temperature element BBTE433B (Steam Generator C) are available. RCS pressure indication is available using BBPI0405. Pressurizer pressure indication is available using BBPI0455A and BBPI0457. A spurious SIS due to low pressurizer pressure on two out of four pressurizer pressure transmitters is averted by entering the EMG procedure network and, if necessary, placing EMHIS0004 and EMHIS0005 in pull-to-lock. When transferring to RHR, valve BBPV8702A may need to be manually opened to provide a suction source from the RCS to RHR pump A. Reactor coolant pumps C and D may not stop using the control room hand switch. RCP seal injection remains available. Therefore, the inability to stop the RCPs will have no adverse impact on PFSSD.

Table A-17-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-17

System	System Name	PFSSD Function*	Comments
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. Train A centrifugal charging pump (CCP) is unaffected. Loss of inventory through the excess letdown path could occur due to spurious opening of BGHV8153B and BGHV8154B. The Train A CCP is available to charge through the BIT. RCP seal flow indication is available using BGFI0215A. RCP seal flow indicator BGFI0215B may be affected.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
BN	Borated Refueling Water Storage System	R, M, H	The RWST is available to provide a suction source to Centrifugal Charging Pump A via valve BNLCV0112D. Containment sump isolation valve EJHV8811B could spuriously open, causing a draindown path from the RWST to the containment sump. Valve BNHV8812B will automatically close, as designed, when EJHV8811B reaches full open position, mitigating draindown. However, if EJHV8811B stalls before reaching full open position, BNHV8812B will not automatically close. In this case, operators can close BNHV8812B using BNHIS8812B in the main control room. RWST level indicators BNLI0930, BNLI0931 and BNLI0932 are available. When initiating RHR, flow from the RWST to RHR pump A can be isolated using BNHV8812A.
EF	Essential Service Water System	H, S	All PFSSD functions associated with the Essential Service Water (ESW) system are satisfied. Train A ESW is available to supply cooling water to Auxiliary Feedwater Pump room cooler SGF02A, Containment Air Coolers SGN01A and SGN01C, Train A Component Cooling Water (CCW) Heat Exchanger, CCW A pump room cooler SGL11A, CCP A room cooler SGL12A and RHR A room cooler SGL10A. Train B ESW flow to containment coolers SGN01B and SGN01D may be affected. Train B ESW is available to supply cooling water to Auxiliary Feedwater Pump room cooler SGF02B, Train B Component Cooling Water (CCW) Heat Exchanger, CCW B pump room cooler SGL11B, CCP B room cooler SGL12B and RHR B room cooler SGL10B.
EG	Component Cooling Water System	S	The PFSSD support function associated with the Component Cooling Water (CCW) system is satisfied. Both trains of CCW are available to provide cooling to essential PFSSD components. A spurious CISB due to 2/4 high containment pressures will isolate the CCW to/from RCP valves, which will isolate thermal barrier cooling. This is acceptable since RCP seal injection remains available. CCW flow indicators EGFI0128 and EGFI0129 are unaffected.

Table A-17-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-17

System	System Name	PFSSD Function*	Comments
EJ	Residual Heat Removal System	M, H, P	All PFSSD functions associated with the Residual Heat Removal (RHR) system are satisfied. Containment sump isolation valve EJHV8811B could spuriously open, causing a draindown path from the RWST to the containment sump. Valve BNHV8812B will automatically close, as designed, when EJHV8811B reaches full open position, mitigating draindown. However, if EJHV8811B stalls before reaching full open position, BNHV8812B will not automatically close. In this case, operators can close BNHV8812B using BNHIS8812B in the main control room.
EM	High Pressure Coolant Injection	R, M	All PFSSD functions associated with the High Pressure Coolant Injection system are satisfied. A spurious SIS can be mitigated by entering EMG E-0 and terminating the spurious SIS.
EN	Containment Spray	R, M	A spurious containment spray actuation signal (CSAS) due to spurious signals on two out of four containment pressure transmitters can be terminated by placing pump control hand switches ENHIS0003 and ENHIS0009 on control room panel RL017 in pull-to-lock.
EP	Safety Injection Accumulators	H	The PFSSD Decay Heat Removal function associated with the Safety Injection Accumulators is satisfied. Accumulator injection lines can be isolated by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. It may be necessary to make a containment entry to manually close EPHV8808B and EPHV8808D.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
GL	Auxiliary Building HVAC	S	The PFSSD Support function associated with the Auxiliary Building HVAC system is satisfied. Electrical penetration room cooler SGL15B may be affected. Redundant Train A room cooler SGL15A is located in a separate fire area and is unaffected.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.

Table A-17-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-17

System	System Name	PFSSD Function*	Comments
GN	Containment Coolers	S	The PFSSD Support function associated with the Containment Coolers is satisfied. Train A (SGN01A and SGN01C) Containment Coolers are available. ESW Train A is available to supply cooling water to the containment coolers. Containment pressure indicators GNPI0935 and GNPI0937 are available.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
NG	480V Load Centers and MCCs	S	The PFSSD Support function associated with the 480 VAC system is satisfied. Train B 480 VAC MCC NG02B is affected. Train A 480 VAC load centers and MCCs are unaffected.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
PA	13.8kV	S	Breaker PA0206 could trip. This will not affect PFSSD since redundant capability exists.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.

Table A-17-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-17

System	System Name	PFSSD Function*	Comments
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
PN	120VAC	S	The primary power supply to panel PN008 is affected. Redundant Train A 120 VAC distribution panel PN007 is unaffected.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
SE	Ex-Core Neutron Monitoring	R, P	Source range monitoring is available using SENE0031 and SENY0060A & B.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-17.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-17. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Containment Spray and Safety Injection

A spurious Safety Injection Signal (SIS) due to low pressurizer pressure and high containment pressure can be mitigated by consulting EMG E-0 and terminating the spurious SIS.

A spurious Containment Spray Actuation Signal (CSAS) can be mitigated by placing CS pump control hand switches ENHIS0003 and ENHIS0009 in pull-to-lock. These switches are located on control room panel RL017. Indication in the Control Room for SI and CS pump operation is unaffected by a fire in A-17.

3.2.2 Mitigation of RWST Draindown to Containment Sump

If a fire occurs in area A-17, it may be necessary to close valve BNHV8812B from the control room using BNHIS8812B to mitigate draindown of the RWST into the containment sump. This condition could occur due to EJHV8811B spuriously opening but stalling before reaching full open position, thereby not providing the permissive for BNHV8812B to close. RWST level indication is available using BNLI0930, BNLI0931 and BNLI0932.

3.2.3 Reactor Head Vent Valves

A fire involving containment penetrations ZSE233 and ZSE234 could cause both Train B reactor head vent valves to open. If this occurs, charging flow can be increased to make up for the inventory loss. Pressurizer level indication is available using BBLI0459A. RCS pressure indication is available using BBPI0405.

3.2.4 Excess Letdown

A fire involving containment penetrations ZSE233 and ZSE234 could cause both Train B excess letdown valves to open. If this occurs, charging flow can be increased to make up for the inventory loss. Pressurizer level indication is available using BBLI0459A.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR

Train B RHR may not be available. If valve BBPV8702A fails to respond when initiating RHR Train A for cold shutdown, make a containment entry to manually open the valve or perform a cold shutdown repair to fix the damaged circuit.

If valve EJHV8840 spuriously opens, close valve EJHV8716A to isolate RHR Train A flow to the hot leg.

3.3.2 Safety Injection Accumulators

It may be necessary to make a containment entry to close SI Accumulator injection valves EPHV8808B and EPHV8808D if these valves are unresponsive from the control room. Otherwise, nitrogen pressure can be relieved from the tanks to prevent injection. Valves EPHV8808A and EPHV8808C are unaffected.

4.0 CONCLUSION

With some exceptions, redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-17.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-17

PFSSD components (S. in E-15000) located in fire area A-17 are shown in Table A-17-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-17-3.

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1409	SGL15B	Electrical Penetration Room Cooler	5.1.1	
1409	EFHS0032	EFHV0032 Control Room Isolation Switch	5.1.4	
1409	EFHS0034	EFHV0034 Control Room Isolation Switch	5.1.4	
1409	EFHS0046	EFHV0046 Control Room Isolation Switch	5.1.4	
1409	EFHS0050	EFHV0050 Control Room Isolation Switch	5.1.4	
1409	EMHS8843	Boron Injection Upstream Test Line Isolation Valve HS	5.1.2	
1409	GLHS0035	Penetration Room Cooler SGL15B Handswitch	5.1.1	
1409	GNHS0009A	Containment Cooler Fan B Run/Iso Handswitch	5.1.3	
1409	GNHIS0009A	Containment Cooler Fan B Hand Indicating Sw	5.1.3	
1409	GNHS0017A	Containment Cooler Fan D Run/Iso Handswitch	5.1.3	
1409	GNHIS0017A	Containment Cooler Fan D Hand Indicating Sw	5.1.3	
1409	GNPT0934	Containment Pressure Transmitter	5.2.1	
1409	GNPT0936	Containment Pressure Transmitter	5.2.1	
1409	NG02B	480V Class 1E Auxiliary Building MCC	5.1.4	
1409	NG02BAF1	Incoming Line From Load Center NG02	5.1.4	
1409	NG02BAF2	Penetration Room Cooler Motor (DSGL15B)	5.1.4	
1409	NG02BBF1	Instr Bus Xfmr - Via NG02ADF1 (XPN08)	5.1.4	
1409	NG02BBF3	RCS Hot Leg 4 To RHR Pmp B Suct (BBPV8702B)	5.1.4	
1409	NG02BBR2	RHR Iso To Cold Leg RCS Loops 3&4 (EJHV8809B)	5.1.4	
1409	NG02BBR3	RHR Iso To RCS Hot Leg Loops 2 & 3 (EJHV8840)	5.1.4	
1409	NG02BCF2	RCS Hot Leg 1 To RHR Pmp A Suct (BBPV8702A)	5.1.4	
1409	NG02BCR1	Seal Water Return Ctmt Iso Valve (BGHV8100)	5.1.4	
1409	NG02BDF1	Pressurizer PORV Isolation Valve (BBHV8000B)	5.1.4	
1409	NG02BDF3	CCW From RCP TBHX Ctmt Iso Vlv (EGHV0062)	5.1.4	
1409	NG02BDR1	ESW B To Ctmt Air Coolers Iso Valve (EFHV0032)	5.1.4	

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1409	NG02BDR2	ESW B From Ctmt Air Coolers Iso Vlv (EFHV0050)	5.1.4	
1409	NG02BEF1	CCW Hx Out To RCS Bypass Iso Valve (EGHV0127)	5.1.4	
1409	NG02BEF2	Ctmt Recirc Sump Isolation Valve (EJHV8811B)	5.1.4	
1409	NG02BER1	Excess Letdown to PRT Isolation Vlv (BBHV8157B)	5.1.4	
1409	NG02BFR1	Relay Panel	5.1.4	
1409	NG02BGF3	Accumulator Tank B Isolation Vlv (EPHV8808B)	5.1.4	
1409	NG02BHF1	CCW From RCP TBHX Ctmt Iso Vlv (EGHV0133)	5.1.4	
1409	NG02BHF2	Accumulator Tank D Isolation Vlv (EPHV8808D)	5.1.4	
1409	NG02BHF3	ESW B To Ctmt Air Coolers Iso Valve (EFHV0034)	5.1.4	
1409	NG02BHR2	ESW B From Ctmt Air Coolers Iso Vlv (EFHV0046)	5.1.4	
1409	NG02T	480V Class 1E Motor Control Center	5.1.3	
1409	NG02TAF1	Containment Cooler Fan Motor (DSGN01B)	5.1.3	
1409	NG04T	480V Class 1E Motor Control Center	5.1.3	
1409	NG04TAF1	Containment Cooler Fan Motor (DSGN01D)	5.1.3	
1409	PG22	480V Non-Class 1E Load Center	5.1.6	
1409	PG2201	480V Non-Class 1E Load Center PG22 Feeder Breaker	5.1.6	
1409	XPG22	480V Non-Class 1E LC Xfmr – Pressurizer Htrs Group B	5.1.6	
1409	SE32	Preamp Source Range Channel 1	5.1.5	

5.1.1 Electrical Penetration Room Cooler

A fire in area A-17 could disable the Train B electrical penetration room cooler (SGL15B). Motor Control Center (MCC) NG02BAF2, which provides power to the room cooler motor, is located in the area and could be damaged. Cable 14GLG12BA is a power cable that runs from the MCC to the room cooler motor and could be damaged.

Hand switch GLHS0035 is a local hand switch mounted on MCC NG02BAF2 that allows SGL15B to be locally started in the event of a fire in the control room. Damage to this switch could impact the ability to operate the unit.

Redundant Train A room cooler SGL15A is located in a separate fire area and is unaffected by a fire in area A-17.

References: E-15000, XX-E-013, E-13GL12A

5.1.2 Boron Injection Tank SIS Test Line

Valve EMHV8843 is normally closed and is required to be closed when injecting through the BIT to ensure adequate flow to the RCS. Local hand isolation switch EMHS8843 and associated cables 14EMK04CA and 14EMK04CD are located in area A-17. Damage to the hand switch or cables could cause the valve to spuriously open.

Cable 14EMK04EA, associated with valve EMHV8871, is located in area A-17. Valve EMHV8871 is located downstream of EMHV8843 and is an alternative means of isolating the SIS test line. Damage to this cable could result in EMHV8871 spuriously opening.

Redundant valve EMHV8964, located downstream of valves EMHV8843 and EMHV8871, is unaffected by a fire in area A-17. This valve is normally closed and will remain closed in the event valves EMHV8843 and EMHV8871 spuriously open. Therefore, the spurious opening of valves EMHV8843 and EMHV8871 will have no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-13EM04, E-13EM04A, E-1F9302, M-12EM01, M-12EM02

5.1.3 Containment Cooling

Hand switches associated with containment coolers SGN01B and SGN01D are located in area A-17. These hand switches are located on MCCs NG02TAF1 and NG04TAF1. The hand switches allow local control of the Train B containment coolers from outside the control room.

Power and control cables associated with Train B containment coolers SGN01B and SGN01D are run in area A-17. Damage to these cables could prevent operation of the coolers.

Damage to the hand switches, MCCs or associated cables will result in a loss of Train B containment coolers. However, Train A containment coolers SGN01A and SGN01C are unaffected by a fire in area A-17 and will remain available to provide containment cooling.

References: E-15000, XX-E-013, E-13GN02A, E-1F9441

5.1.4 Train B 480 Volt Class 1E Auxiliary Building MCC NG02B

Motor Control Center (MCC) NG02B is located in area A-17. A number of PFSSD loads are supplied by this MCC. A fire in area A-17 could disrupt power to the MCC and prevent operation of the supplied loads. The following table identifies the PFSSD components that could be lost if this occurs and whether a redundant component on the opposite train is available.

480 VAC Motor Control Center NG02B		
MCC Breaker	**Description**	**Redundant Component**
NG02BAF1	Incoming Line From NG02	NG01
NG02BAF2	Penetration Room Cooler DSGL15B	DSGL15A
NG02BBF1	Primary Power Feed to PN08	PG20GER5
NG02BBF3	Valve BBPV8702B	See below
NG02BBR2	Valve EJHV8809B	EJHV8809A
NG02BBR3	Valve EJHV8840	See below
NG02BCF2	Valve BBPV8702A	See below
NG02BCR1	Valve BGHV8100	BGHV8112
NG02BDF1	Valve BBHV8000B	BBPCV0456A
NG02BDF3	Valve EGHV0062	See below
NG02BDR1	Valve EFHV0032	EFHV0031
NG02BDR2	Valve EFHV0050	EFHV0049
NG02BEF1	Valve EGHV0127	EGHV0058
NG02BEF2	Valve EJHV8811B	See below
NG02BER1	Valve BBHV8157B	BBHV8157A
NG02BFR1	Relay Panel (EJHV8811B)	See below
NG02BGF3	Valve EPHV8808B	See below
NG02BHF1	Valve EGHV0133	EGHV0061
NG02BHF2	Valve EPHV8808D	See below
NG02BHF3	Valve EFHV0034	EFHV0033
NG02BHR2	Valve EFHV0046	EFHV0045

The power supply to both valves BBPV8702A and BBPV8702B (RCS to RHR pumps A and B) could be disrupted. For hot standby, this is acceptable since the power supply to these valves is normally de-energized at the MCC and the valves are maintained closed. For cold shutdown, however, the valves may not be able to be opened from the control room or from the MCC. If necessary, a cold shutdown repair could be performed to repair damage to the power supply or a containment entry could be made to open the appropriate valve.

Valve EJHV8840 is normally closed and is required to remain closed for PFSSD. Loss of power to the valve will not have an adverse impact on PFSSD since the valve is normally closed.

Valve EGHV0062 is normally open and will remain open if power is lost. PFSSD requires this valve to be open, or normally closed bypass valve EGHV0132 opened, when using CCW to maintain thermal barrier cooling. Valve EGHV0132 is unaffected by a fire in area A-17 and is available to be opened in the unlikely event valve EGHV0062 spuriously closes.

Valve EJHV8811B is normally closed and is required to remain closed for PFSSD. Loss of power to the valve will maintain it in its closed position. Therefore, loss of power to this valve will have no adverse impact on PFSSD.

NG02BFR1 is a relay panel section that houses relay 3XEJ19 associated with EJHV8811B. Loss of power to this relay will maintain the valve in its normally closed position, which is the desired PFSSD position.

Accumulator tank valves EPHV8808B and EPHV8808D are required to be closed prior to the RCS reaching @ 1,000 psi to prevent accidental accumulator injection. Loss of power to the valves will prevent them from being closed when necessary. The valves are closed when going to cold shutdown, so a cold shutdown repair is allowed. The power cable can either be repaired or nitrogen pressure can be relieved from the tanks to prevent injection. Otherwise, a containment entry can be made to close the valves.

Based on the above discussion, loss of power to NG02B will have no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-13EJ06B, E-13NG01, E-13PN01, E-1F9421, E-1F9424A, E-1F9424B, E-1F9424D, M-12AL01, M-12BB01, M-12BG01, M-12BG03, M-12EF02, M-12EG03, M-12EM02, M-12EP01

5.1.5 Source Range Monitors

PFSSD requires source range (SR) flux monitoring to be available. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B.

Damage to SE32 or associated cables will prevent SENE0032 from operating. Damage to the cable associated with SENY0061A/B will prevent this source range monitor from operating. However, redundant source range monitors are available and are unaffected by a fire in area A-17.

For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013, Attachment 3.

References: E-15000, XX-E-013, E-1F9101, E-13SE01, E-13SE02, E-13SE07

5.1.6 Pressurizer Backup Group B Heaters

The pressurizer backup group B heaters are credited in procedure OFN RP-017 to control pressurizer pressure following a control room fire. The heaters are not required for post-fire safe shutdown following a fire in other areas of the plant.

Load center PG22, feeder breaker PG2201 and transformer XPG22 supply power to the heaters. These components were added to the PFSSD equipment list because they are required following a control room fire.

Damage to these components due to a fire in area A-17 could cause the spurious operation or mal-operation of the backup group B heaters. Calculation WCNOC-CP-002 shows that spurious operation or mal-operation of the heaters will not adversely impact the ability to achieve safe shutdown. Therefore, damage to this switch in the event of a fire in area A-17 will not affect safe shutdown.

References: E-15000, XX-E-013, E-13BB24, WCNOC-CP-002

5.2 PFSSD CABLE EVALUATION

Table A-17-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-17. The applicable evaluation section is also listed in Table A-17-4.

Table A-17-4
PFSSD Cables Located in Fire Area A-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12AEI08EB	1409	AELT0519	I	5.2.2	Steam Generator A Narrow Range Water Level
12AEI08FB	1409	AELT0549	I	5.2.2	Steam Generator D Narrow Range Water Level
12AEI08GB	1409	AELT0502	I	5.2.2	Steam Generator B Wide Range Water Level
12AEI12BB	1409	AELT0552	I	5.2.2	Steam Generator B Narrow Range Water Level
12AEI12CB	1409	AELT0553	I	5.2.2	Steam Generator C Narrow Range Water Level
12BBI15EB	1409	BBTE0413B	I	5.2.3	RCS Cold Leg Temp Element (WR) Loop 1
12BBI15HB	1409	BBTE0423B	I	5.2.3	RCS Cold Leg Temp Element (WR) Loop 2
12BBI15JB	1409	BBTE0443A	I	5.2.3	RCS Hot Leg Temp Element (WR) Loop 4
12BBI15KB	1409	BBTE0433A	I	5.2.3	RCS Hot Leg Temp Element (WR) Loop 3
12BBI15NB	1409	BBPT0403	I	5.2.4	RCS Pressure Wide Range Hot Leg
12BBI16LB	1409	BBPT0456	I	5.2.1 5.2.7 5.2.18	Pressurizer Pressure Transmitter
12BBI16QB	1409	BBLT0460	I	5.2.5	Pressurizer Level Transmitter (Narrow Range)
12GNI05BA	1409	GNPT0936	I	5.2.1	Containment Pressure Transmitter
12SES02BB	1409	SE0032	I	5.1.5	Source Range Monitor
12SES02BC	1409	SE0032	I	5.1.5	Source Range Monitor
12SES02BG	1409	SE0032	I	5.1.5	Source Range Monitor
14AEI08LB	1409	AELT0504	I	5.2.2	Steam Generator D Wide Range Water Level
14AEI08NB	1409	AELT0517	I	5.2.2	Steam Generator A Narrow Range Water Level
14AEI08PB	1409	AELT0527	I	5.2.2	Steam Generator B Narrow Range Water Level
14AEI08QB	1409	AELT0537	I	5.2.2	Steam Generator C Narrow Range Water Level
14AEI08RB	1409	AELT0547	I	5.2.2	Steam Generator D Narrow Range Water Level

Table A-17-4
PFSSD Cables Located in Fire Area A-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BBG04AA	1409	BBHV8351A	P	5.2.6	RCP A Seal Water Injection Valve
14BBG04AB	1409	BBHV8351A	C	5.2.6	RCP A Seal Water Injection Valve
14BBG04BA	1409	BBHV8351B	P	5.2.6	RCP B Seal Water Injection Valve
14BBG04BB	1409	BBHV8351B	C	5.2.6	RCP B Seal Water Injection Valve
14BBG04CA	1409	BBHV8351C	P	5.2.6	RCP C Seal Water Injection Valve
14BBG04CB	1409	BBHV8351C	C	5.2.6	RCP C Seal Water Injection Valve
14BBG04DA	1409	BBHV8351D	P	5.2.6	RCP D Seal Water Injection Valve
14BBG04DB	1409	BBHV8351D	C	5.2.6	RCP D Seal Water Injection Valve
14BBG12AA	1409	BBPV8702A	P	5.2.4	RCS Hot Leg 1 To RHR Pump A Suction Vlv
14BBG12AB	1409	BBPV8702A	C	5.2.4	RCS Hot Leg 1 To RHR Pump A Suction Vlv
14BBG12AC	1409	BBPV8702A	C	5.2.4	RCS Hot Leg 1 To RHR Pump A Suction Vlv
14BBG12AD	1409	BBPV8702A	C	5.2.4	RCS Hot Leg 1 To RHR Pump A Suction Vlv
14BBG12AE	1409	BBPV8702A	C	5.2.4	RCS Hot Leg 1 To RHR Pump A Suction Vlv
14BBG12AF	1409	BBPV8702A	C	5.2.4	RCS Hot Leg 1 To RHR Pump A Suction Vlv
14BBG12AG	1409	BBPV8702A	C	5.2.4	RCS Hot Leg 1 To RHR Pump A Suction Vlv
14BBG12BA	1409	BBPV8702B	P	5.2.4	RCS Hot Leg 4 To RHR Pump B Suction Vlv
14BBG12BB	1409	BBPV8702B	C	5.2.4	RCS Hot Leg 4 To RHR Pump B Suction Vlv
14BBG12BC	1409	BBPV8702B	C	5.2.4	RCS Hot Leg 4 To RHR Pump B Suction Vlv
14BBG12BD	1409	BBPV8702B	C	5.2.4	RCS Hot Leg 4 To RHR Pump B Suction Vlv
14BBG12BF	1409	BBPV8702B	C	5.2.4	RCS Hot Leg 4 To RHR Pump B Suction Vlv
14BBG12BG	1409	BBPV8702B	C	5.2.4	RCS Hot Leg 4 To RHR Pump B Suction Vlv
14BBG12BK	1409	BBPV8702B	C	5.2.4	RCS Hot Leg 4 To RHR Pump B Suction Vlv
14BBG39BA	1409	BBHV8000B	P	5.2.7	Pressurizer PORV BBPCV0456A Block Valve

Table A-17-4
PFSSD Cables Located in Fire Area A-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BBG39BB	1409	BBHV8000B	C	5.2.7	Pressurizer PORV BBPCV0456A Block Valve
14BBG39BC	1409	BBHV8000B	C	5.2.7	Pressurizer PORV BBPCV0456A Block Valve
14BBG39BF	1409	BBHV8000B	C	5.2.7	Pressurizer PORV BBPCV0456A Block Valve
14BBG39BJ	1409	BBHV8000B	C	5.2.7	Pressurizer PORV BBPCV0456A Block Valve
14BBI16BA	1409	BBPT0406	I	5.2.8	RCS Pressure Wide Range Hot Leg
14BBI16NB	1409	BBPT0458	I	5.2.1 5.2.7 5.2.18	Pressurizer Pressure Transmitter
14BBK30BA	1409	BBHV8001B	C	5.2.9	RCS Head Vent Valve
14BBK30DA	1409	BBHV8002B	C	5.2.9	RCS Head Vent Valve
14BBK40BG	1409	BBPCV0456A	P	5.2.7	Pressurizer PORV
14BBK40BJ	1409	BBPCV0456A	C	5.2.7	Pressurizer PORV
14BGI51BA	1409	BGFT0215B	I	5.2.6	RCP Seal Total Flow Transmitter
14BGK48AB	1409	BGHV8153B	C	5.2.11	Excess Letdown Line Isolation Valve
14BGK48BB	1409	BGHV8154B	C	5.2.11	Excess Letdown Line Isolation Valve
14BNI07FA	1409	BNLT0933	I	5.2.12	RWST Level Transmitter
14EFG04BA	1409	EFHV0060	P	5.2.10	ESW B Return from CCW Heat Exchanger B
14EFG04BB	1409	EFHV0060	C	5.2.10	ESW B Return from CCW Heat Exchanger B
14EFG05BA	1409	EFHV0052	P	5.2.10	ESW B To CCW Heat Exchanger B
14EFG05BB	1409	EFHV0052	C	5.2.10	ESW B To CCW Heat Exchanger B
14EFG07BA	1409	EFHV0032	P	5.2.13	ESW B To Ctmt Air Coolers Iso Valve
14EFG07BB	1409	EFHV0032	C	5.2.13	ESW B To Ctmt Air Coolers Iso Valve
14EFG07BC	1409	EFHV0032	C	5.2.13	ESW B To Ctmt Air Coolers Iso Valve

Table A-17-4
PFSSD Cables Located in Fire Area A-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EFG08BA	1409	EFHV0050	P	5.2.13	ESW B From Ctmt Air Coolers Iso Valve
14EFG08BB	1409	EFHV0050	C	5.2.13	ESW B From Ctmt Air Coolers Iso Valve
14EFG08BC	1409	EFHV0050	C	5.2.13	ESW B From Ctmt Air Coolers Iso Valve
14EFG09BA	1409	EFHV0034	P	5.2.13	ESW B To Ctmt Air Coolers Iso Valve
14EFG09BB	1409	EFHV0034	C	5.2.13	ESW B To Ctmt Air Coolers Iso Valve
14EFG09BC	1409	EFHV0034	C	5.2.13	ESW B To Ctmt Air Coolers Iso Valve
14EFG09DA	1409	EFHV0046	P	5.2.13	ESW B From Ctmt Air Coolers Iso Valve
14EFG09DB	1409	EFHV0046	C	5.2.13	ESW B From Ctmt Air Coolers Iso Valve
14EFG09DC	1409	EFHV0046	C	5.2.13	ESW B From Ctmt Air Coolers Iso Valve
14EGG10AA	1409	EGHV0062	P	5.2.10	CCW Return From RC Pmp Thermal Barrier
14EGG10AB	1409	EGHV0062	C	5.2.10	CCW Return From RC Pmp Thermal Barrier
14EGG10AC	1409	EGHV0062	C	5.2.10	CCW Return From RC Pmp Thermal Barrier
14EGG10AD	1409	EGHV0062	C	5.2.10	CCW Return From RC Pmp Thermal Barrier
14EGG18BA	1409	EGHV0127	P	5.2.10	CCW HX Out To RCS Bypass Isolation Valve
14EGG18BB	1409	EGHV0127	C	5.2.10	CCW HX Out To RCS Bypass Isolation Valve
14EGG18BC	1409	EGHV0127	C	5.2.10	CCW HX Out To RCS Bypass Isolation Valve
14EGG18BD	1409	EGHV0127	C	5.2.10	CCW HX Out To RCS Bypass Isolation Valve
14EGG18DA	1409	EGHV0133	P	5.2.10	EG-HV-61 Bypass Valve
14EGG18DB	1409	EGHV0133	C	5.2.10	EG-HV-61 Bypass Valve
14EGG18DC	1409	EGHV0133	C	5.2.10	EG-HV-61 Bypass Valve
14EGG18DD	1409	EGHV0133	C	5.2.10	EG-HV-61 Bypass Valve
14EJG06BC	1409	EJHV8811B	C	5.2.12	Containment Sump Isolation Valve
14EJG06BD	1409	EJHV8811B	C	5.2.12	Containment Sump Isolation Valve

Table A-17-4
PFSSD Cables Located in Fire Area A-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EJG06BF	1409	EJHV8811B	C	5.2.12	Containment Sump Isolation Valve
14EJG06BJ	1409	EJHV8811B	C	5.2.12	Containment Sump Isolation Valve
14EJG06BK	1409	EJHV8811B	C	5.2.12	Containment Sump Isolation Valve
14EJG06BT	1409	EJHV8811B	C	5.2.12	Containment Sump Isolation Valve
14EJG09AA	1409	EJHV8840	P	5.2.14	RHR Isolation To RCS Hot Leg Loops 2 & 3
14EJG09AB	1409	EJHV8840	C	5.2.14	RHR Isolation To RCS Hot Leg Loops 2 & 3
14EJG09AC	1409	EJHV8840	C	5.2.14	RHR Isolation To RCS Hot Leg Loops 2 & 3
14EJG09AD	1409	EJHV8840	C	5.2.14	RHR Isolation To RCS Hot Leg Loops 2 & 3
14EJG09BA	1409	EJHV8809B	P	5.2.14	RHR Iso Valve To Cold Leg RCS Loops 3 & 4
14EJG09BB	1409	EJHV8809B	C	5.2.14	RHR Iso Valve To Cold Leg RCS Loops 3 & 4
14EJG09BC	1409	EJHV8809B	C	5.2.14	RHR Iso Valve To Cold Leg RCS Loops 3 & 4
14EJG09BD	1409	EJHV8809B	C	5.2.14	RHR Iso Valve To Cold Leg RCS Loops 3 & 4
14EMK04CA	1409	EMHV8843	C	5.1.2	SIS Test Line Isolation Valve
14EMK04CD	1409	EMHV8843	C	5.1.2	SIS Test Line Isolation Valve
14EMK04EA	1409	EMHV8871	C	5.1.2	SIS Test Line Isolation Valve
14ENG03BA	1409	ENHV0012	P	5.2.1	Containment Spray Isolation Valve
14ENG03BB	1409	ENHV0012	C	5.2.1	Containment Spray Isolation Valve
14ENG03BC	1409	ENHV0012	C	5.2.1	Containment Spray Isolation Valve
14ENG03BD	1409	ENHV0012	C	5.2.1	Containment Spray Isolation Valve
14EPG02CA	1409	EPHV8808B	P	5.2.15	Accumulator Injection Valve
14EPG02CB	1409	EPHV8808B	C	5.2.15	Accumulator Injection Valve
14EPG02CE	1409	EPHV8808B	C	5.2.15	Accumulator Injection Valve
14EPG02DA	1409	EPHV8808B	P	5.2.15	Accumulator Injection Valve

Table A-17-4
PFSSD Cables Located in Fire Area A-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EPG02DB	1409	EPHV8808B	C	5.2.15	Accumulator Injection Valve
14EPG02DE	1409	EPHV8808B	C	5.2.15	Accumulator Injection Valve
14GLG12BA	1409	SGL15B	P	5.1.1	South Electrical Penetration Room Cooler
14GNG02BC	1409	SGN01B	P	5.1.3	Train B Containment Cooler
14GNG02BD	1409	SGN01B	C	5.1.3	Train B Containment Cooler
14GNG02BG	1409	SGN01B	P	5.1.3	Train B Containment Cooler
14GNG02BH	1409	SGN01B	C	5.1.3	Train B Containment Cooler
14GNG02DC	1409	SGN01D	P	5.1.3	Train B Containment Cooler
14GNG02DD	1409	SGN01D	C	5.1.3	Train B Containment Cooler
14GNG02DG	1409	SGN01D	P	5.1.3	Train B Containment Cooler
14GNG02DH	1409	SGN01D	C	5.1.3	Train B Containment Cooler
14GNI05DA	1409	GNPT0934	I	5.2.1	Containment Pressure Transmitter
14NBB14AD	1409	NB0209	C	N/A	Cable is not located in area A-17. It is installed in a tray section that traverses fire area A-16S and A-17. The cable terminates in panel RP333, which is located in fire area A-16S.
14NGG01AD	1409	NG02B	P	5.1.4	Incoming Power from Load Center NG02
14NGG01AE	1409	NG02B	P	5.1.4	Incoming Power from Load Center NG02
14NGG01AJ	1409	NG02T	P	5.1.3	Incoming Power from Load Center NG02
14NGG01BF	1409	NG04T	P	5.1.3	Incoming Power from Load Center NG04
14PNG01AE	1409	PN008	P	5.1.4	Primary Power feed to Panel PN008 via XPN08A
14SES07AC	1409	SENY0061A/B	I	5.1.5	Source Range Monitor
16BBA01CE	1409	DPBB01C	C	5.2.16	Reactor Coolant Pump C Motor

Table A-17-4
PFSSD Cables Located in Fire Area A-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16BBA01DE	1409	DPBB01D	C	5.2.16	Reactor Coolant Pump D Motor
16PGA10CA	1409	PA0206	C	5.2.17	Load Centers PG12, PG16 and PG26 Fdr Bkr

5.2.1 Safety Injection and Containment Spray

Calculation XX-E-013, Appendix 1 (PFSSD Support Section) provides a detailed discussion about the potential PFSSD impact of a spurious safety injection signal (SIS) and spurious containment spray actuation signal (CSAS). This section discusses the specific PFSSD impact if a fire occurs in this area.

Containment pressure transmitters GNPT0934 and GNPT0936, and associated cables, are located in area A-17. Consequently, a spurious CSAS due to high containment pressure can occur if a fire occurs in area A-17. Also, a spurious SIS due to high containment pressure can occur since two of the three containment pressure SIS initiators are located in area A-17.

Cables associated with BBPT0456 and BBPT0458 are run in area A-17. Consequently, a fire in area A-17 can cause a spurious SIS due to low pressurizer pressure.

Power and control cables associated with containment spray isolation valve ENHV0012 are located in this area. Damage to these cables will not cause the valve to spuriously open. However, a CSAS will cause the valve to open. As described below, a spurious CSAS can be mitigated from the control room.

A spurious SIS starts the charging sequence which starts the CCPs and opens the BIT flowpath valves. For a fire in this area, the BIT flowpath valves are unaffected and would open on a SIS. The RWST valves are unaffected and would open on a SIS. Also, the CCP mini flow valves are unaffected and CCW flow to the seal water heat exchanger is unaffected to ensure cooling of the recirc flow, RCP seal return and CCP oil cooler. Therefore, the charging pumps will not be affected by a spurious SIS caused by a fire in this area.

A start of the credited CCW system (Train A) will not adversely impact the system. The Train A ESW system is unaffected and will start on a spurious SIS, providing necessary cooling water to the CCW heat exchanger.

A start of the AFW pumps will not adversely impact PFSSD. All three AFW pumps are unaffected by a fire in this area. Suction from the CST to the AFW pumps is unaffected. Discharge flow will either return to the CST or flow to the steam generators through the discharge control valves. Therefore, the AFW pumps are unaffected by a spurious SIS caused by a fire in this area.

A start of the RHR pumps due to a spurious SIS will not adversely impact either pump. The RWST supply to the pumps is not affected and the recirculation valves will remain in the open position. Component cooling water is available to both RHR heat exchangers. Operators will have time to terminate the spurious SIS and stop the pumps.

A spurious Containment Spray Actuation Signal (CSAS) due to spurious high containment pressure can be mitigated by placing CS pump control hand switches ENHIS0003 and ENHIS0009 in pull-to-lock. These switches are located on control room panel RL017. Indication in the Control Room for SI and CS pump operation is unaffected by a fire in A-17.

Based on the above discussion, a spurious SIS and CSAS can occur if a fire occurs in this area. Credited PFSSD equipment will not be damaged by the spurious SIS. The CSAS can be terminated from the control room. Therefore, a spurious SIS and CSAS will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13BB16, E-13EM01, E-13EN03, E-13GN05, E-1F9431, E-1F9432, E-1F9433

5.2.2 Steam Generator Level Indication

The decay heat removal function for PFSSD requires the use of two RCS loops and two Steam Generators. Steam generator (SG) level indication is required to support this function. A fire in area A-17 credits the Train A motor driven auxiliary feedwater pump (MDAFP), which is normally aligned to supply SGs B and C.

Each steam generator has 5 level indicators; one wide range and 4 narrow range. At least one of the 5 level transmitters needs to be available to satisfy the PFSSD function. Table A-17-4 lists the cables and associated level transmitters run in area A-17.

The following steam generator level transmitters are unaffected by a fire in area A-17:

Steam Generator A	AELT0501 (Wide Range) AELT0518 (Narrow Range) AELT0551 (Narrow Range)
Steam Generator B	AELT0528 (Narrow Range) AELT0529 (Narrow Range)
Steam Generator C	AELT0503 (Wide Range) AELT0538 (Narrow Range) AELT0539 (Narrow Range)
Steam Generator D	AELT0548 (Narrow Range) AELT0554 (Narrow Range)

Therefore, at least one level transmitter on each steam generator is available if a fire occurs in area A-17.

References: E-15000, XX-E-013, E-13AE08, E-13AE12, M-12AE02, E-1F9203

5.2.3 RCS Hot and Cold Leg Temperature Elements

PFSSD requires RCS hot and cold leg temperature indication on at least one loop to verify flow through the steam generators. The temperature elements used for this purpose are listed in Table A-17-5.

A fire in area A-17 could damage instrumentation cables associated with temperature elements BBTE0413B, BBTE0423B, BBTE0433A and BBTE0443A. Consequently, temperature indication on at least one leg on each loop could be lost, which is not in accordance with the PFSSD methodology at Wolf Creek.

Table A-17-5
RCS Hot and Cold Leg Temperature Elements Used for PFSSD

COMPONENT	FUNCTION
BBTE0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	RCS Cold Leg Temperature Element (WR) Loop 3

Table A-17-5 RCS Hot and Cold Leg Temperature Elements Used for PFSSD	
COMPONENT	**FUNCTION**
BBTE0443A	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	RCS Cold Leg Temperature Element (WR) Loop 4

EMG ES-04 provides alternate indication that may be used. One of these methods verifies that steam generator pressure is stable or decreasing. S/G "B" and S/G "C" pressure instruments ABPT524 and ABPT534 are unaffected by a fire in A-17 and can be used per EMG ES-04 to verify heat removal in loops 2 and 3.

The configuration is acceptable because, in the event of fire in fire area A-17, cooldown will be performed using RCS loops 2 and 3. RCS wide range hot and cold leg temperature elements (BBTE0423A and BBTE0433B) and pressure transmitters ABPT0524 and ABPT0534 will provide indication.

References: E-15000, XX-E-013, E-1F9201, E-13BB15, M-12AB01, M-12BB01

5.2.4 Residual Heat Removal (RHR)

Cold shutdown mode of PFSSD requires RHR taking suction from the RCS. RHR pump suction from the RCS is controlled by valves BBPV8702A and EJHV8701A (Train A) and BBPV8702B and EJHV8701B (Train B).

Power and control cables associated with BBPV8702A and BBPV8702B run through area A-17. Damage to any of these cables could prevent opening the associated valve from the control room. During normal power operation, the MCC breaker for these valves is open which would prevent the valves from spuriously opening due to cable damage. However, since the valves are high-low pressure interface boundaries, consideration of 3-phase cable to cable hot shorts in the proper sequence is required. The cables are run in raceway with other 3-phase cables, which presents the possibility that a 3-phase hot short could occur, although unlikely due to the use of thermoset cables. In the unlikely event a hot short occurs such that the valves spuriously open, valves EJHV8701A and EJHV8701B are unaffected by the fire and will remain closed.

During normal power operation, RCS pressure is approximately 2,236 psig. An open permissive interlock relay (K734) prevents valves BBPV8702A and BBPV8702B from opening when RCS pressure is greater than 360 psig, as sensed by pressure transmitter BBPT0403. Damage to cable 12BBI15NB, associated with pressure transmitter BBPT0403, could send a false High-1 RCS pressure signal and maintain the contacts on relay K734 open, which would prevent remote opening of valves BBPV8702A and BBPV8702B. Also, damage to the cable could send a false low pressure signal, which would close the contact and provide the permissive to open the valve. As stated in the previous paragraph, spurious opening of the valves is mitigated by maintaining valves EJHV8701A and EJHV8701B closed.

A fire in area A-17 may cause the spurious opening of valves BBPV8702A and BBPV8702B, but redundant valves EJHV8701A and EJHV8701B will remain closed. When going to cold shutdown, a cold shutdown repair may be required to be made within 72 hours, per 10CFR50, Appendix R, or a containment entry to manually open BBPV8702A or BBPV8702B, depending on the RHR Train used.

References: E-15000, XX-E-013, E-13BB12A, E-13BB12B, E-13BB15, E-1F9205, M-12BB04

5.2.5 Pressurizer Level Transmitters

PFSSD requires pressurizer level indication to be available. Pressurizer level indication is provided by level transmitters BBLT0459 and BBLT0460. Circuits for BBLT0460 are run in area A-17, so BBLT0460 may not be available. Circuits for BBLT0459/BBLI0459A do not run through fire area A-17 and are unaffected by a fire.

Pressurizer level indication is available for a fire in area A-17 using BBLT0459/BBLI0459A.

References: E-15000, E-1F9301, E-13BB16

5.2.6 Reactor Coolant Pump (RCP) Seal Injection

PFSSD requires RCP seal injection to provide a boron injection path, provide makeup to the RCS to maintain hot standby inventory and prevent damage to the RCP seals. The Component Cooling Water (CCW) system is an alternative means of cooling the RCP seals.

Cables 14BBG04AA, 14BBG04AB, 14BBG04BA, 14BBG04BB, 14BBG04CA, 14BBG04CB, 14BBG04DA and 14BBG04DB associated with normally open RCP seal injection valves BBHV8351A, BBHV8351B, BBHV8351C and BBHV8351D are located in area A-17. The RCP seal injection valves are not high-low pressure interface valves, so consideration of a 3-phase proper polarity hot short is not required. A hot short, open circuit or short to ground involving these cables will not cause the valves to close. Therefore, RCP seal injection valves BBHV8351A, BBHV8351B, BBHV8351C and BBHV8351D will remain in their normally open position if a fire occurs anywhere in this area. Furthermore, the valves are de-energized so cable damage could not cause the valves to close.

Both trains of charging are available if a fire occurs in this area. If the normal charging pump stops as a result of the fire, operators can start either charging pump, depending on the CCW train that is operating.

Cable 14BGI51BA is associated with RCP seal total flow indicator BGFT0215B. Damage to this cable could prevent operation of the flow transmitter and could prevent operators from determining total RCP seal flow using flow indicator BGFI0215B. Flow indicator BGFI0215A is unaffected by a fire in area A-17 and can be used by operators to determine if seal flow is functioning.

Based on the above discussion, there is reasonable assurance that the seal injection valves will remain open in the event of a fire in area A-17. Therefore, RCP seal injection is available to provide hot standby inventory control and seal cooling. Loss of the operating charging pump would be indicated by loss of flow to the RCP seals using flow indicator BGFI0215A.

References: E-15000, XX-E-013, E-13BB04, E-13BG51, E-1F9303

5.2.7 Pressurizer Power Operated Relief Valves and Associated Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed. Cables and components associated with PORV BBPCV0456A and associated block valve BBHV8000B are located in area A-17.

The pressurizer PORVs are not considered high/low pressure interfaces. The valves are supplied power by an ungrounded 125 VDC system. Therefore, based on GL 86-10, consideration of multiple proper polarity hot shorts is not required. A single proper polarity hot short still needs to be considered.

Cables 14BBK40BG and 14BBK40BJ associated with PORV BBPCV0456A are run in this area. Based on a review of drawing E-13BB40, it would take two concurrent proper polarity hot shorts to cause the PORV to spuriously open. Therefore, a fire in area A-17 is not postulated to open PORV BBPCV0456A due to damage to the control cables associated with the PORV.

Instrument cables 12BBI16LB and 14BBI16NB associated with pressurizer pressure transmitters BBPT0456 and BBPT0458, respectively, are run in fire area A-17. As discussed in Calculation XX-E-013, Appendix 1, the Ovation pressurizer pressure control system uses 4-channel verification from all four pressurizer pressure transmitters to operate the pressurizer PORVs. Failure of a single channel will not cause the spurious operation of the PORVs since the system uses the 2nd highest input as the validated signal. Damage to two channels will not cause the PORVs to open because both channels would have to fail to the exact same value at the exact same time and this failure mode is not credible, as discussed in XX-E-013.

Based on the above discussion, a fire in area A-17 will have no adverse impact on BBPCV0456A.

References: E-15000, XX-E-013, M-12BB02, E-13BB16, E-13BB39, E-13BB40, M-761-02018, OFN KC-016, J-200-00207, CR 13079, DCP 12944, DCP 13324

5.2.8 Reactor Coolant System (RCS) Pressure Indication

PFSSD requires RCS pressure indication to be available. RCS pressure indication is provided in the control room using BBPI0405 or BBPI0406.

Cable 14BBI16BA, associated with BBPT0406 runs through fire area A-17. Damage to this cable could prevent operation of the pressure transmitter and prevent pressure indication in the control room on BBPI0406.

Cables for BBPT0405 are run in a separate fire area and are unaffected by a fire in area A-17. Therefore, RCS pressure indication will be available using BBPI0405 if a fire occurs in area A-17.

References: E-15000, XX-E-013, E-1F9201, E-13BB15, E-13BB16, M-12BB04

5.2.9 Reactor Head Vent Valves

PFSSD requires that one of the two reactor vessel head vent valves on each flow path (2 flow paths total) be closed to prevent loss of inventory and uncontrolled depressurization of the RCS. Cables for two of the four head vent valves run through area A-17. The head vent valves are considered high-low pressure interfaces, so consideration of multiple proper polarity hot shorts is required.

Cables for head vent valves BBHV8001A and BBHV8002A are not run through A-17. Therefore, isolation of the separation group 1 flow path is assured. Either BBHV8001B or BBHV8002B needs to be closed to prevent RCS depressurization through the separation group 4 head vent flow path.

Cable 14BBK30BA associated with valve BBHV8001B is run in conduit through area A-17 and enters containment penetration assembly ZSE234. The conduit carries one other cable (14BGK48AB) which is a control cable for excess letdown isolation valve BGHV8153B and is normally de-energized. The containment penetration assembly contains multiple 125 VDC cables that could present a source of 125 VDC power to energize and open the valve. An intra-cable short in cable 14BBK30BA would not cause the valve to open because this failure mode would not energize the control solenoid. However, a fire that affects containment

penetration assembly ZSE234 could cause a single or multiple proper polarity inter-cable hot short that would open valve BBHV8001B.

Cable 14BBK30DA associated with valve BBHV8002B is run in cable tray through area A-17 and enters containment penetration assembly ZSE233. The cable tray and penetration assembly contain multiple 125 VDC cables that could present a source for 125 VDC power to energize the valve. An intra-cable short in cable 14BBK30DA would not cause the valve to open because this failure mode would not energize the control solenoid. However, a fire that affects the cable tray and containment penetration assembly ZSE233 could cause a single or multiple proper polarity inter-cable hot short that would open valve BBHV8002B.

Based on this discussion, the Train B reactor head vent valves could open if a fire occurs in area A-17. This would cause a loss of RCS inventory that is within the makeup capability of the charging pumps. Therefore, spurious opening of the Train B RCS head vent flowpath will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-1F9301, E-13BB30, E-1R1413D, E-1R1423A, E-1R1423C, E-1R1433A, E-1R1433B, M-12BB04

5.2.10 Component Cooling Water

Component Cooling Water (CCW) is required for PFSSD to provide cooling flow to the CCP oil coolers, the seal water heat exchanger, the RHR pump seal coolers and the RHR heat exchangers. The CCW system is also redundant to the RCP seal injection system to provide RCP seal cooling through the thermal barrier.

All four CCW pumps and both essential service water pumps are available if a fire occurs in this area. A loss of off-site power to NB01 and NB02 will not occur if a fire occurs in this area. Therefore, the operating train of CCW will remain operating in the event of a fire.

A number of cables associated with EGHV0062, EGHV0127 and EGHV0133 are run in this area. Damage to cables associated with EGHV0127 and EGHV0133 will have no adverse impact because these valves are located in the bypass lines for valves EGHV0058 and EGHV0061, respectively. Valves EGHV0058 and EGHV0061 are unaffected by a fire in this area and will remain open.

Cables 14EGG10AA, 14EGG10AB, 14EGG10AC and 14EGG10AD associated with EGHV0062 are run in this area. Damage to cables 14EGG10AC or 14EGG10AD could cause the valve to spuriously close, preventing CCW flow to the thermal barrier heat exchangers. Bypass valve EGHV0132 is unaffected and can be opened from the control room to restore thermal barrier cooling. Flow indicators EGFI0128 and EGFI0129 are unaffected and can be used to diagnose a loss of CCW flow to the RCP thermal barriers.

Cables 14EFG05BA and 14EFG05BB, associated with Train B ESW to CCW heat exchanger valve EFHV0052, and cables 14EFG04BA and 14EFG04BB, associated with Train B ESW from CCW heat exchanger valve EFHV0060, are run in area A-17. Damage to the cables would not result in the valves spuriously operating but could prevent the valves from being operated from the control room. If the Train A CCW system is operating at the time of the fire, then all valves will be in their proper lineup. If the Train B CCW system is operating at the time of the fire, these valves will remain in their required PFSSD position and continued operation of the Train B CCW system is available.

Based on the above discussion, both trains of CCW are available to provide cooling to essential PFSSD components. Train A is the credited train if a fire occurs in this area and eventual swapover to train A CCW will be required if Train B CCW is operating at the time of the fire.

References: E-15000, XX-E-013, E-1F9303, E-13EF04A, E-13EG10, E-13EG17A, E-13EG18, E-13EG18A

5.2.11 Excess Letdown Isolation Valves

PFSSD requires the excess letdown path be isolated to prevent loss of inventory and uncontrolled depressurization of the RCS. To accomplish this, either normally closed valve BGHV8153A or BGHV8154A must be maintained closed and either normally closed valve BGHV8153B or BGHV8154B must be maintained closed. Valves BGHV8153A and BGHV8154A are unaffected by a fire in area A-17.

Cable 14BGK48AB associated with valve BGHV8153B is run in conduit through area A-17 and enters containment penetration assembly ZSE234. The conduit carries one other cable (14BBK30BA), which is a control cable for RCS head vent valve BBHV8001B and is normally de-energized. The containment penetration assembly contains multiple 125 VDC cables that could present a source of 125 VDC power to energize and open the valve. An intra-cable short in cable 14BGK48AB would not cause the valve to open because this failure mode would not energize the solenoid. However, a fire that affects containment penetration assembly ZSE234 could cause a single or multiple proper polarity inter-cable hot short that would open valve BGHV8153B.

Cable 14BGK48BB associated with valve BGHV8154B is run in cable tray through area A-17 and enters containment penetration assembly ZSE233. The cable tray and penetration assembly contain multiple 125 VDC cables that could present a source for 125 VDC power to energize the valve. An intra-cable short in cable 14BGK48BB would not cause the valve to open because this failure mode would not energize the control solenoid. However, a fire that affects the cable tray and containment penetration assembly ZSE233 could cause a single or multiple proper polarity inter-cable hot short that would open valve BGHV8154B.

Based on this discussion, the Train B excess letdown flow path could open if a fire occurs in area A-17. This would cause a loss of RCS inventory that is within the makeup capability of the charging pumps. Calculation WCNOC-CP-002 shows that a failed open excess letdown flowpath does not need to be mitigated. Therefore, spurious opening of the Train B excess letdown flow path will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-1F9301, E-13BG48, E-1R1423A, M-12BG01, WCNOC-CP-002

5.2.12 Refueling Water Storage Tank (RWST)

The RWST level transmitters are interlocked with the containment sump isolation valves (EJHV8811A&B). In the event that two out of four low-low RWST level signals are received, co-incident with a SIS, valves EJHV8811A and EJHV8811B will open, draining the RWST into the containment sump. A spurious SIS is possible for a fire in area A-17, as discussed previously.

Cable 14BNI07FA, associated with RWST level transmitter BNLT0933, is run in area A-17. Circuits for the remaining three RWST level transmitters are not run in area A-17. A spurious low-low RWST level signal cannot occur due to a fire in area A-17 since circuits for at least two RWST level transmitters are not run in the area.

Power and control cables associated with containment sump isolation valve EJHV8811B are run in area A-17. A hot short within cable 14EJG06BT could cause the valve to spuriously open. In addition, there are other cable failure scenarios requiring multiple simultaneous shorts that could cause the valve to spuriously open. If valve EJHV8811B were to spuriously open

while valve BNHV8812B is open, the RWST would drain to the containment sump. However, cables associated with the automatic close permissive on valve BNHV8812B are unaffected by the fire and would result in closure of valve BNHV8812B when valve EJHV8811B is fully open. If valve EJHV8811B spuriously opens but stalls before reaching full open position, valve BNHV8812B will not automatically close. If this occurs, operators will recognize a decreasing RWST level using BNLI0930, BNLI0931 and/or BNLI0932 and take action to close BNHV8812B using BNHIS8812B in the main control room.

Based on the above discussion, there is reasonable assurance that a fire in area A-17 will not result in uncontrolled draindown of the RWST into the containment sump.

References: E-15000, XX-E-013, E-1F9205, E-13BN03A, E-13BN07, E-13EJ06A, E-13EJ06B, E-025-00007, M-10BN

5.2.13 Containment Coolers

PFSSD requires containment cooling to maintain the containment environment within EQ limits. Cables associated with the ESW supply to the Train B containment coolers are run in area A-17. These circuits are listed in Table A-17-4.

Damage to these cables could prevent operation of the Train B containment coolers due to spurious closure of one or more of the valves. However, circuits for the Train A containment coolers are run in a separate fire area and are unaffected by a fire in area A-17.

Therefore, the Train A containment coolers will remain available to provide containment cooling in the event of a fire in area A-17.

References: E-15000, XX-E-013, E-1F9441, E-13EF07, E-13EF08, E-13EF09, E-13GN02, E-13GN02A, E-13NG01, M-12EF02

5.2.14 RHR To RCS Hot and Cold Legs

During cold shutdown mode, PFSSD requires one RHR pump operating and discharging into the cold legs of either Loops 1 and 2 (Train A RHR) or 3 and 4 (Train B RHR). In addition, hot leg injection needs to be isolated.

Valve EJHV8840 is required to be closed to prevent injection through the hot leg of loops 2 and 3. Cables associated with this valve run through area A-17. In order for the valve to spuriously open, it would take two simultaneous hot shorts within the same multi-conductor cable. This is unlikely to occur since it would take the proper source conductor shorting to a specific target conductor without shorting to a different conductor or shorting to ground to cause the valve to open. In the unlikely event the valve spuriously opens, a cold shutdown repair can be performed, or valve EJHV8716A can be manually closed, to prevent flow from Train A RHR through this flow path. If Train B RHR is being used, then valve EJHV8716B can be closed to isolate this flow path.

Either EJHV8809A or EJHV8809B needs to be open when operating RHR pumps A or B, respectively. Cables associated with EJHV8809B run through area A-17 and could be damaged such that the valve spuriously closes. Cables associated with valve EJHV8809A are not run in area A-17. Consequently, valve EJHV8809A is unaffected if a fire occurs in area A-17.

Based on the above discussion, a flow path is available to ensure RHR flow to the RCS.

References: E-15000, XX-E-013, E-13EJ09A, E-1F9205, M-12EJ01

5.2.15 Safety Injection Accumulator Isolation Valves

PFSSD requires isolation of the SI accumulators prior to reducing RCS pressure below the injection pressure to avoid unnecessary accumulator discharge. This is accomplished by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. These valves are normally open with the MCC breaker locked in the open position. Cables for valves EPHV8808B and EPHV8808D are run in area A-17 and are listed in Table A-17-4.

Since the breakers for these valves are normally open, damage to these cables will not cause the valve to spuriously change position. However, damage to the cables will prevent closing the associated valve from the control room after power is restored.

The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig. If necessary, a containment entry can be made to manually close the valves or nitrogen pressure can be relieved from the tanks to prevent injection.

A fire in area A-17 may require a containment entry to close valves EPHV8808B and EPHV8808D if these valves are unresponsive from the control room.

References: E-15000, XX-E-013, E-13EP02A, M-12EP01

5.2.16 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs.

Control cables associated with reactor coolant pumps C and D are run in fire area A-17. Damage to these cables in the event of a fire could prevent operators from stopping the C and D RCPs from the control room. However, a fire in A-17 will not cause a loss of all seal cooling since RCP seal injection remains available.

Based on the above discussion, the inability to trip the C and D RCPs from the control room will have no adverse impact on PFSSD. The pumps can continue to operate, providing forced flow circulation. If the pumps spuriously stop, natural circulation cooldown can be used.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1

5.2.17 Load Center Feeder Breaker PA0206

Load center feeder breaker PA0206 is credited for PFSSD because it supplies power to credited non-safety related loads. Cable 16PGA10CA is a control cable associated with breaker PA0206. An intra-cable hot short in this cable will trip PA0206. Breaker PA0206 supplies power to the following PFSSD components:

- PG12KAF4 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0032
- PG12KAF5 – Main Steam Supply to Steam Seals Valve ABHV0046
- PG12KEF3 – Auxiliary Steam System Control Valve FBHV0080

PG12KAF4, PG12KAF5 and PG12KEF3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using either hand switch ABHS0079 or ABHS0080. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Based on the above discussion, loss of breaker PA0206 due to a fire in area A-17 will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13PG10, E-1F9424E

5.2.18 Normal Pressurizer Spray

The normal pressurizer spray valves are included in the PFSSD design because spurious operation of pressurizer sprays can cause a decrease in pressure which can lead to boiling in the core. The pressurizer spray valves are part of the pressurizer pressure control system.

The pressurizer normal spray valves (BBPCV0455B and BBPCV0455C) operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

Instrument cables 12BBI16LB and 14BBI16NB associated with pressurizer pressure transmitters BBPT0456 and BBPT0458, respectively, are run in fire area A-17. As discussed in Calculation XX-E-013, Appendix 1, damage to one or more pressure input channels will not cause the spurious operation of the pressurizer spray valves due to the Ovation 4-channel validation logic. Therefore, a fire in area A-17 will not cause the spurious operation of pressurizer spray.

References: E-15000, XX-E-013, E-13BB16, M-744-00028, M-761A-00063, DCP 13324

FIRE AREA A-18

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-18 is located on the 2026 elevation of the Auxiliary Building and includes the room listed in Table A-18-1.

Table A-18-1
Room Located in Fire Area A-18

ROOM #	DESCRIPTION
1410	North Electrical Penetration Room (Train A)

Fire area A-18 is protected with a total flooding Halon fire suppression system. In addition, automatic fire detection is installed throughout. The automatic suppression and detection system meets the intent of 10CFR50, Appendix R, Section III.G.2.c.

In some cases where redundant circuits are run through area A-18, circuits associated with one of the redundant components are wrapped with a raceway fire barrier material meeting the requirements for a 1-hour fire rating. This fire barrier along with automatic suppression and detection installed in the area meets Wolf Creek commitments to 10 CFR 50, Appendix R Section III.G.2(c) and provides reasonable assurance that PFSSD can be achieved.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-18-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-18-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-18

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	All PFSSD functions associated with the main steam system are satisfied. Steam generator A, C and D ARVs are unaffected. It may be necessary to isolate SG B ARV using local control station ABFHC0002. Steam generator pressure indication is available using ABPI0514A, ABPI0524A, ABPI0526A, ABPI0534A, ABPI0536A, and ABPI0544A.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
AE	Main Feedwater	H, P	All PFSSD functions associated with the main feedwater system are satisfied. Steam generator A level indication is available using narrow range level transmitters AELT0517 and AELT0519. Steam generator D level indication is available using narrow range level indicators AELI0547 and AELI0549 and wide range level indicator AELI0504.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. Train B MDAFP is available to supply S/Gs A and D. ALFT0001 and ALFT0007 are available to provide auxiliary feedwater flow indication from MDAFP B to SGs D and A, respectively. Condensate Storage Tank (CST) pressure indication is available.
AP	Condensate Storage System	H	The condensate storage system is available to supply water to Train B MDAFP.

Table A-18-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-18

System	System Name	PFSSD Function*	Comments
BB	Reactor Coolant System	R, M, H, P, S	All PFSSD functions associated with the reactor coolant system are satisfied. RCS pressure indication is available using BBPI0405 or BBPI0406. RCS wide range cold and hot leg temperature elements (BBTE413B and BBTE443A) and pressure transmitters ABPT0516 and ABPT0546 will provide indication that cooldown is being achieved. Pressurizer level indication is available using BBLI0460A. Pressurizer pressure indication is available using BBPI0456 and BBPI0458. A spurious start of the SI Pumps due to two out of four low pressurizer pressures can be mitigated by placing the pump control hand switches EMHIS0004 and EMHIS0005 on panel RL017 in pull-to-lock. Loss of RCS inventory through the RHR flow path is prevented by maintaining valves BBPV8702A and BBPV8702B closed. RCP thermal barrier cooling could be affected due to spurious closure of BBHV0013, BBHV0014, BBHV0015 and BBHV0016. Reactor coolant pumps A and B may not stop using the control room hand switch. RCP seal injection remains available. Therefore, the inability to stop the RCPs will have no adverse impact on PFSSD. Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, pressurizer spray can be stopped by closing KAFV0029 using KAHIS0029 in the main control room. Loss of inventory through the head vent valves could occur due to spurious opening of BBHV8001A and BBHV8002A. The Train B CCP is available to charge through the BIT.
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. Train B Centrifugal Charging Pump (CCP) is available to provide charging flow from the RWST to the RCP seals. Flow from the VCT can be isolated by closing BGLCV0112B. Loss of inventory through the excess letdown path could occur due to spurious opening of BGHV8153A and BGHV8154A. The Train B CCP is available to charge through the BIT. Charging flow through the BIT is assured. BGHV8106 may not respond to a close signal from the control room. Valve BGHV8105, and its hand switch (BGHIS8105), are unaffected by a fire in area A-18. Letdown isolation valves BGLCV0459 and BGLCV0460 and letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C may need to be failed closed by closing valve KAFV0029 using KAHIS0029 in the main control room.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.

Table A-18-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-18

System	System Name	PFSSD Function*	Comments
BN	Borated Refueling Water Storage System	R, M, H	If containment sump isolation valve EJHV8811A spuriously opens and stalls before reaching full open position, BNHV8812A will not automatically close. In this case, operators can close BNHV8812A using BNHIS8812A in the main control room to mitigate draindown of the RWST into the containment sump.
EF	Essential Service Water System	H, S	All PFSSD functions associated with the Essential Service Water (ESW) system are satisfied. ESW flow to Train B Containment Air Coolers is available via valves EFHV0032, EFHV0034, EFHV0046 and EFHV0050.
EG	Component Cooling Water System	S	CCW flow to the RCP thermal barriers could be affected as discussed in BB System comments above. CCW flow indicators EGFI0128 and EGFI0129 are unaffected.
EJ	Residual Heat Removal System	M, H, P	All PFSSD functions associated with the Residual Heat Removal (RHR) system are satisfied. If valve EJHV8701B fails to respond when initiating RHR for cold shutdown, make a containment entry to manually open the valve or perform a cold shutdown repair to fix the damaged circuit. Containment sump isolation valve EJHV8811A could spuriously open, causing a draindown path from the RWST to the containment sump. Valve BNHV8812A will automatically close, as designed, when EJHV8811A reaches full open position, mitigating draindown. However, if EJHV8811A stalls before reaching full open position, BNHV8812A will not automatically close. In this case, operators can close BNHV8812A using BNHIS8812A in the main control room. Valve EJHV8811B is unaffected. RHR system flow diagnostic instrumentation is available using various available temperature indicators.
EM	High Pressure Coolant Injection	R, M	Charging flow from CCP B to the RCS is available through the BIT by opening valves EMHV8803B and EMHV8801B. Prevent flow diversion through the SIS test line when charging through the BIT by maintaining either valve EMHV8871 or valve EMHV8964 closed. A spurious SIS can be mitigated by entering EMG E-0 and terminating the spurious SIS.
EN	Containment Spray	R, M	A spurious containment spray actuation signal (CSAS) due to spurious signals on two out of four containment pressure transmitters can be terminated by placing pump control hand switches ENHIS0003 and ENHIS0009 on control room panel RL017 in pull-to-lock. Train A containment spray isolation valve ENHV0006 could spuriously open. Containment spray can be mitigated as described in the previous paragraph.
EP	Safety Injection Accumulators	H	A containment entry may be required to close SI Accumulator injection valves EPHV8808A and EPHV8808C if these valves are unresponsive from the control room. The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.

Table A-18-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-18

System	System Name	PFSSD Function*	Comments
FC	Auxiliary Turbines	R, H, P	All PFSSD functions associated with the Auxiliary Turbines are satisfied. The Turbine Driven Auxiliary Feedwater Pump is not used for a fire in area A-18.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
GF	AFW Pump Room Coolers	S	AFW Pump B room cooler is unaffected by a fire in area A-18.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
GL	Auxiliary Building HVAC	S	The PFSSD Support function associated with the Auxiliary Building HVAC system is satisfied. Train B CCP room cooler SGL12B is available. Train B RHR pump room cooler SGL10B is available.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
GN	Containment Coolers	S	Train B Containment Air Coolers SGN01B and SGN01D are available. Containment pressure indicators GNPI0934 and GNPI0936 are available.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.

Table A-18-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-18

System	System Name	PFSSD Function*	Comments
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
NG	480V Load Centers and MCCs	S	Train B MCCs NG02B, NG02T and NG04T are not affected by a fire in area A-18.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
PN	120VAC	S	One of the two sources of power to non-class 1E 120 VAC panel PN07 is affected by a fire in this area. The alternate power source is unaffected. In addition, non-class 1E 120 VAC panel PN08 is unaffected.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
QD	Emergency Lighting	S	Emergency lighting for PFSSD outside the control room is provided by self-contained 8-hour battery powered lights. Emergency lighting in the control room is provided by 125 VDC emergency lighting distribution switchboard NK051A. The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.

Table A-18-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-18

System	System Name	PFSSD Function*	Comments
SA	ESFAS	S	Status panel input for valves ABHV0005 and ABHV0006, associated with the TDAFP, may be affected. This is acceptable since the TDAFP is not used for a fire in area A-18.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
SE	Ex-Core Neutron Monitoring	R, P	Source range monitoring is available for a fire in area A-18 using SR monitors SENE0032 and SENY0060A/B.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-18.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-18. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs

If damage occurs to cables associated with ABPV0002, local control station ABFHC0002, located in fire area A-23, can be used to close ARV ABPV0002.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Mitigation of RWST Draindown to Containment Sump

If a fire occurs in area A-18, it may be necessary to close valve BNHV8812A from the control room using BNHIS8812A to mitigate draindown of the RWST into the containment sump. This condition could occur due to EJHV8811A spuriously opening but stalling before reaching full open position, thereby not providing the permissive for BNHV8812A to close. RWST level indication is available using all four level indicators.

3.2.2 Containment Spray and Safety Injection

A spurious Safety Injection Signal (SIS) due to low pressurizer pressure and high containment pressure can be mitigated by consulting EMG E-0 and terminating the spurious SIS.

A spurious Containment Spray Actuation Signal (CSAS) can be mitigated by placing CS pump control hand switches ENHIS0003 and ENHIS0009 in pull-to-lock. These switches are located on control room panel RL017. Indication in the Control Room for SI and CS pump operation is unaffected by a fire in A-18.

3.2.3 Auxiliary Feedwater Pumps

It may be necessary to manually trip Train A MDAFP (PAL01A) using ALHIS0023A in the main control room due to possible loss of room cooler and loss of control of valves ALHV0009 and ALHV0011, which could lead to overfilling steam generators B and C.

3.2.4 Reactor Head Vent Valves

A fire in this area could cause both Train A reactor head vent valves to open. If this occurs, operators will need to increase charging flow to make up for the inventory loss. Pressurizer level indication is available using BBLI0460A. RCS pressure indication is available using BBPI0405 or BBPI0406.

3.2.5 Excess Letdown

A fire in this area could cause both Train A excess letdown valves to open. If this occurs, operators will need to increase charging flow to make up for the inventory loss. Pressurizer level indication is available using BBLI0460A.

3.2.6 Normal Pressurizer Spray

Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, the spray can be stopped by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer pressure indication is available using BBPI0456 and BBPI0458.

3.2.7 Isolation of Letdown

A fire in area A-18 could prevent valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B, and BGHV8149C from being closed using their associated control room hand switches. If this occurs, the valves can be closed by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer level indication is available using BBLI0460A.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR

If valve EJHV8701B fails to respond when initiating RHR for cold shutdown, make a containment entry to manually open the valve or perform a cold shutdown repair to fix the damaged circuit.

3.3.2 SI Accumulators

A fire in area A-18 may require a containment entry to close SI Accumulator injection valves EPHV8808A and EPHV8808C if these valves are unresponsive from the control room. The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig.

4.0 CONCLUSION

With some exceptions, redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-18.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-18

PFSSD components (S. in E-15000) located in fire area A-18 are shown in Table A-18-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-18-3.

Table A-18-3
PFSSD Equipment Located in Fire Area A-18

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1410	DSGL15A	North Electrical Penetration Room Cooler	5.1.1	
1410	EMHS8882	Local Hand Switch for Boron Injection Downstream Test Line Isolation Valve	5.1.2	
1410	GNHIS13A	Containment Cooler Fan C Hand Indicating Sw.	5.1.3	
1410	GNHIS5A	Containment Cooler Fan A Hand Indicating Sw.	5.1.3	
1410	GNPT0935	Containment Pressure Transmitter	5.1.4	
1410	GNPT0937	Containment Pressure Transmitter	5.1.4	
1410	NG01B	480V Train A Class 1E Auxiliary Building MCC	5.1.5	
1410	NG01BAF1	Incoming Line from Load Center NG01	5.1.5	
1410	NG01BAR1	Distribution Panelboard	5.1.5	
1410	NG01BBF3	RC Pump Seal Water Isolation Valve (BGHV8112)	5.1.5	
1410	NG01BBR1	Charging Pump to RCS Isolation Valve (BGHV8106)	5.1.5	
1410	NG01BBR3	Pressurizer PORV Isolation Valve (BBHV8000A)	5.1.5	
1410	NG01BCF1	Aux Feedwater Pump Room Cooler Fan (DSGF02A)	5.1.5	
1410	NG01BCF2	ESW to Ctmt Air Coolers Iso Valve (EFHV0033)	5.1.5	
1410	NG01BCR1	RHR to Cold Leg Iso Valve (EJHV8809A)	5.1.5	
1410	NG01BCR3	Ctmt Spray Pump Iso Valve (ENHV0006)	5.1.5	
1410	NG01BDF2	ESW From Ctmt Air Coolers Iso Valve (EFHV0045)	5.1.5	
1410	NG01BDF3	RHR Loop 4 Hot Leg to RHR Pump B Suction (EJHV8701B)	5.1.5	
1410	NG01BDR1	Aux Feedwater Discharge Valve (ALHV0009)	5.1.5	
1410	NG01BDR2	Aux Feedwater Discharge Valve (ALHV0011)	5.1.5	
1410	NG01BDR4	Boron Injection Tank Inlet Iso Valve (EMHV8803A)	5.1.5	
1410	NG01BEF1	Electrical Penetration Room Cooler (DSGL0015A)	5.1.5	

Table A-18-3
PFSSD Equipment Located in Fire Area A-18

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1410	NG01BEF2	Loop 1 Hot Leg to RHR Pump A Suction Iso Valve (EJHV8701A)	5.1.5	
1410	NG01BEF4	Instrumentation Bus Transformer (XPN07)	5.1.5	
1410	NG01BER2	Boron Injection Tank Discharge Iso Valve (EMHV8801A)	5.1.5	
1410	NG01BFF1	CCW Containment Isolation Valve (EGHV0126)	5.1.5	
1410	NG01BFF3	Ctmt Sump to RHR Pump Iso Valve (EJHV8811A)	5.1.5	
1410	NG01BFR1	Relay Panel	5.1.5	
1410	NG01BGF2	Accumulator Tank C Outlet Valve (EPHV8808C)	5.1.5	
1410	NG01BGF3	Accumulator Tank A Outlet Valve (EPHV8808A)	5.1.5	
1410	NG01BGR1	CCW Ctmt Isolation Valve (EGHV0058)	5.1.5	
1410	NG01BGR2	CCW Ctmt Isolation Valve (EGHV0059)	5.1.5	
1410	NG01BHF1	ESW to Ctmt Air Cooler Iso Valve (EFHV0031)	5.1.5	
1410	NG01BHF3	CCW Containment Iso Valve (EGHV0132)	5.1.5	
1410	NG01BHR2	ESW From Ctmt Air Coolers Iso Valve (EFHV0049)	5.1.5	
1410	NG01BKF1	Excess Letdown Hx Throttle Valve (BBHV8157A)	5.1.5	
1410	NG01T	480V Class 1E MCC	5.1.3	
1410	NG01TAF1	Containment Cooler Fan (DSGN01A)	5.1.3	
1410	NG03T	480V Class 1E MCC	5.1.3	
1410	NG03TAF1	Containment Cooler Fan (DSGN01C)	5.1.3	
1410	SE31	Source Range Channel 1	5.1.6	

5.1.1 North Electrical Penetration Room Cooler

A fire in area A-18 will result in the loss of the North Electrical Penetration Room cooler (DSGL15A). Cable 11GLG12AA, associated with this room cooler, will be damaged. The redundant South Electrical Penetration Room cooler is unaffected by a fire in area A-18 and will be used if a fire occurs in area A-18.

References: E-15000, XX-E-013

5.1.2 Boron Injection Downstrean Test Line Isolation Valves

To prevent CCP flow diversion through the SIS test line when charging through the BIT, valves EMHV8843 and EMHV8882 need to be closed. If either or both of these valves cannot be closed, then closing or maintaining closed either valve EMHV8871 or EMHV8964 will accomplish the PFSSD objective.

Cable 15EMK05EA is a control cable for EMHV8882. A +125 VDC external cable hot short in contact with conductor 2 in cable 15EMK05EA will energize the solenoid and open valve EMHV8882. The cable is run in raceways with cables carrying the proper voltage and polarity. The hot short would bypass the control room hand switch (EMHIS8882) on RL018 and control of this valve from the control room would be lost.

Cable 15EMK05EC is a control cable for EMHV8882. A short across the conductors in this cable will not have an impact on PFSSD since hand switch EMHS8882 is normally closed. An open on either conductor will de-energize the solenoid and close valve EMHV8882.

CCP flow diversion through the SIS test line is prevented by valves EMHV8871 or EMHV8964. Cables associated with EMHV8871 and EMHV8964 are run in a different fire area. Therefore, the flow path can be isolated using either EMHV8871 or EMHV8964.

References: E-15000, XX-E-013, E-13EM05A, E-1F9302, M-12EM01

5.1.3 Containment Cooler Fans A and C Hand Switches

GNHIS5A is the containment cooler fan A (DSGN01A) hand switch. This switch is located on NG01TAF1 in area A-18. GNHIS13A is the containment cooler fan C (DSGN01C) hand switch. This switch is located on NG03TAF1 in area A-18.

Damage to GNHIS5A and GNHIS13A, as well as associated cables, will prevent operation of containment coolers A and C. However, containment coolers B and D are unaffected by a fire in area A-18 and will be available to supply the needed containment cooling demand.

For a detailed evaluation, refer to the discussion on DSGN01A and DSGN01C in section 5.2.

References: E-15000, XX-E-013, E-1F9441

5.1.4 Containment Pressure Transmitters

Pressure transmitters GNPT0935 and GNPT0937 do not perform PFSSD functions. However, damage to these transmitters or associated cables could initiate a spurious Safety Injection Signal (SIS) or Containment Spray Actuation Signal (CSAS), which is not desired for PFSSD at Wolf Creek.

For a detailed cable analysis on spurious SIS or CSAS, see Section 5.2.

References: E-15000, XX-E-013, E-1F9431

5.1.5 Train A 480 VAC Motor Control Center

MCC NG01B supplies 480 VAC power to a number of Train A PFSSD components. A fire in area A-18 could cause loss of power to these loads. Damage to cables 11NGG01AD and 11NGG01AE will also cause loss of power to NG01B.

Redundant Train B components are powered from 480 VAC MCC NG02B. Therefore, loss of power to 480 VAC MCC NG01B will not affect PFSSD.

References: E-15000, XX-E-013, E-1F9424A, E-03NG01

5.1.6 Source Range Monitors

PFSSD requires source range (SR) flux monitoring to be available. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B.

Damage to SE31 or associated cable 11SES01BB will prevent SENE0031 from operating. However, redundant source range monitors are available and are unaffected by a fire in area A-18.

For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013, Attachment 3.

References: E-15000, XX-E-013, E-1F9101, E-13SE01, E-13SE02, E-13SE07

5.2 PFSSD CABLE EVALUATION

Table A-18-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-18. The applicable evaluation section is also listed in Table A-18-4.

Table A-18-4
PFSSD Cables Located in Fire Area A-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ABI20EE	1410	ABPV0001	I	5.2.1	1-hour wrap provided
11AEI08AB	1410	AELT0501	I	5.2.3	SG A Wide Range Level Transmitter
11AEI08BB	1410	AELT0529	I	5.2.3	SG B Narrow Range Level Transmitter
11AEI08CB	1410	AELT0539	I	5.2.3	SG C Narrow Range Level Transmitter
11AEI12AB	1410	AELT0551	I	5.2.3	SG A Narrow Range Level Transmitter
11AEI12DB	1410	AELT0554	I	5.2.3	SG D Narrow Range Level Transmitter
11ALY09CD	1410	ALHV0009	C	5.2.4	MDAFP A to SG B Control Valve
11ALY09CE	1410	ALHV0009	P	5.2.4	MDAFP A to SG B Control Valve
11ALY09DD	1410	ALHV0011	C	5.2.4	MDAFP A to SG C Control Valve
11ALY09DE	1410	ALHV0011	P	5.2.4	MDAFP A to SG C Control Valve
11BBG03AA	1410	BBHV0013	P	5.2.12	RCP A Thermal Barrier Return Iso Valve
11BBG03AB	1410	BBHV0013	C	5.2.12	RCP A Thermal Barrier Return Iso Valve
11BBG03BA	1410	BBHV0014	P	5.2.12	RCP B Thermal Barrier Return Iso Valve
11BBG03BB	1410	BBHV0014	C	5.2.12	RCP B Thermal Barrier Return Iso Valve
11BBG03CA	1410	BBHV0015	P	5.2.12	RCP C Thermal Barrier Return Iso Valve
11BBG03CB	1410	BBHV0015	C	5.2.12	RCP C Thermal Barrier Return Iso Valve
11BBG03DA	1410	BBHV0016	P	5.2.12	RCP D Thermal Barrier Return Iso Valve
11BBG03DB	1410	BBHV0016	C	5.2.12	RCP D Thermal Barrier Return Iso Valve
11BBG39AA	1410	BBHV8000A	P	5.2.5	Pressurizer PORV Block Valve
11BBG39AB	1410	BBHV8000A	C	5.2.5	Pressurizer PORV Block Valve
11BBG39AC	1410	BBHV8000A	C	5.2.5	Pressurizer PORV Block Valve
11BBG39AF	1410	BBHV8000A	C	5.2.5	Pressurizer PORV Block Valve
11BBG39AJ	1410	BBHV8000A	C	5.2.5	Pressurizer PORV Block Valve

Table A-18-4
PFSSD Cables Located in Fire Area A-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BBI15HB	1410	BBTE0413A	I	5.2.2	RCS Hot Leg Temp (WR) Loop 1
11BBI15JB	1410	BBTE0423A	I	5.2.2	RCS Hot Leg Temp (WR) Loop 2
11BBI15KB	1410	BBTE0443B	I	5.2.2	RCS Cold Leg Temp (WR) Loop 4
11BBI15LB	1410	BBTE0433B	I	5.2.2	RCS Cold Leg Temp (WR) Loop 3
11BBI16KB	1410	BBPT0455	I	5.2.5 5.2.6 5.2.25	Pressurizer Pressure Transmitter
11BBI16PB	1410	BBLT0459	I	5.2.7	Pressurizer Level Transmitter
11BBI28AA	1410	BBFT0017	I	5.2.12	BBHV0013 Flow Control
11BBI28BA	1410	BBFT0018	I	5.2.12	BBHV0014 Flow Control
11BBI28CA	1410	BBFT0019	I	5.2.12	BBHV0015 Flow Control
11BBI28DA	1410	BBFT0020	I	5.2.12	BBHV0016 Flow Control
11BBK30AA	1410	BBHV8001A	C	5.2.8	Head Vent Valve
11BBK30CA	1410	BBHV8002A	C	5.2.8	Head Vent Valve
11BBK40AG	1410	BBPCV0455A	C	5.2.5	Pressurizer PORV
11BBK40AJ	1410	BBPCV0455A	C	5.2.5	Pressurizer PORV
11BGG11BA	1410	BGHV8106	P	5.2.9	Charging Pumps to Regenerative Heat Exchanger
11BGG11BB	1410	BGHV8106	C	5.2.9	Charging Pumps to Regenerative Heat Exchanger
11BGG11BC	1410	BGHV8106	C	5.2.9	Charging Pumps to Regenerative Heat Exchanger
11BGK48CB	1410	BGHV8153A	C	5.2.10	Excess Letdown Iso Valve
11BGK48DB	1410	BGHV8154A	C	5.2.10	Excess Letdown Iso Valve

Table A-18-4
PFSSD Cables Located in Fire Area A-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EFG07AA	1410	EFHV0031	P	5.2.11	ESW to Trn A Containment Air Coolers
11EFG07AB	1410	EFHV0031	C	5.2.11	ESW to Trn A Containment Air Coolers
11EFG07AC	1410	EFHV0031	C	5.2.11	ESW to Trn A Containment Air Coolers
11EFG08AA	1410	EFHV0049	P	5.2.11	ESW from Trn A Cont Air Coolers
11EFG08AB	1410	EFHV0049	C	5.2.11	ESW from Trn A Cont Air Coolers
11EFG08AC	1410	EFHV0049	C	5.2.11	ESW from Trn A Cont Air Coolers
11EFG09AA	1410	EFHV0033	P	5.2.11	ESW to Trn A Containment Air Coolers
11EFG09AB	1410	EFHV0033	C	5.2.11	ESW to Trn A Containment Air Coolers
11EFG09AC	1410	EFHV0033	C	5.2.11	ESW to Trn A Containment Air Coolers
11EFG09CA	1410	EFHV0045	P	5.2.11	ESW from Trn A Cont Air Coolers
11EFG09CB	1410	EFHV0045	C	5.2.11	ESW from Trn A Cont Air Coolers
11EFG09CC	1410	EFHV0045	C	5.2.11	ESW from Trn A Cont Air Coolers
11EGG09AA	1410	EGHV0058	P	5.2.12	CCW HX to RCP A, B, C and D
11EGG09AB	1410	EGHV0058	C	5.2.12	CCW HX to RCP A, B, C and D
11EGG09AC	1410	EGHV0058	C	5.2.12	CCW HX to RCP A, B, C and D
11EGG09AD	1410	EGHV0058	C	5.2.12	CCW HX to RCP A, B, C and D
11EGG17BA	1410	EGHV0132	C	5.2.12	CCW HX from RCP A, B, C and D
11EGG17BB	1410	EGHV0132	C	5.2.12	CCW HX from RCP A, B, C and D
11EGG17BC	1410	EGHV0132	C	5.2.12	CCW HX from RCP A, B, C and D
11EGG17BD	1410	EGHV0132	P	5.2.12	CCW HX from RCP A, B, C and D
11EGG18AA	1410	EGHV0126	P	5.2.12	CCW HX to RCP A, B, C and D
11EGG18AB	1410	EGHV0126	C	5.2.12	CCW HX to RCP A, B, C and D
11EGG18AC	1410	EGHV0126	C	5.2.12	CCW HX to RCP A, B, C and D

Table A-18-4
PFSSD Cables Located in Fire Area A-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EGG18AD	1410	EGHV0126	C	5.2.12	CCW HX to RCP A, B, C and D
11EJG05AA	1410	EJHV8701A	P	5.2.13	RCS to RHR Pump A
11EJG05AB	1410	EJHV8701A	C	5.2.13	RCS to RHR Pump A
11EJG05AC	1410	EJHV8701A	C	5.2.13	RCS to RHR Pump A
11EJG05AF	1410	EJHV8701A	C	5.2.13	RCS to RHR Pump A
11EJG05AG	1410	EJHV8701A	C	5.2.13	RCS to RHR Pump A
11EJG05AJ	1410	EJHV8701A	C	5.2.13	RCS to RHR Pump A
11EJG05AK	1410	EJHV8701A	C	5.2.13	RCS to RHR Pump A
11EJG05BA	1410	EJHV8701B	P	5.2.13	RCS to RHR Pump B
11EJG05BB	1410	EJHV8701B	C	5.2.13	RCS to RHR Pump B
11EJG05BC	1410	EJHV8701B	C	5.2.13	RCS to RHR Pump B
11EJG05BF	1410	EJHV8701B	C	5.2.13	RCS to RHR Pump B
11EJG05BG	1410	EJHV8701B	C	5.2.13	RCS to RHR Pump B
11EJG05BJ	1410	EJHV8701B	C	5.2.13	RCS to RHR Pump B
11EJG05BK	1410	EJHV8701B	C	5.2.13	RCS to RHR Pump B
11EJG06AC	1410	EJHV8811A	C	5.2.14	Cntmt Recirc Sump Isolation Valve
11EJG06AD	1410	EJHV8811A	C	5.2.14	Cntmt Recirc Sump Isolation Valve
11EJG06AJ	1410	EJHV8811A	P	5.2.14	Cntmt Recirc Sump Isolation Valve
11EJG06AK	1410	EJHV8811A	C	5.2.14	Cntmt Recirc Sump Isolation Valve
11EJG06AT	1410	EJHV8811A	C	5.2.14	Cntmt Recirc Sump Isolation Valve
11EJG06AU	1410	EJHV8811A	C	5.2.14	Cntmt Recirc Sump Isolation Valve
11EJG09CA	1410	EJHV8809A	P	5.2.15	RHR Pmp A Disch to RCS
11EJG09CB	1410	EJHV8809A	C	5.2.15	RHR Pmp A Disch to RCS

Table A-18-4
PFSSD Cables Located in Fire Area A-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EJG09CC	1410	EJHV8809A	C	5.2.15	RHR Pmp A Disch to RCS
11EJG09CD	1410	EJHV8809A	C	5.2.15	RHR Pmp A Disch to RCS
11EMG02AA	1410	EMHV8803A	P	5.2.16	Train A BIT Inlet Valve
11EMG02AB	1410	EMHV8803A	C	5.2.16	Train A BIT Inlet Valve
11EMG02AC	1410	EMHV8803A	C	5.2.16	Train A BIT Inlet Valve
11EMG02CA	1410	EMHV8801A	P	5.2.16	Train A BIT Outlet Valve
11EMG02CB	1410	EMHV8801A	C	5.2.16	Train A BIT Outlet Valve
11EMG02CE	1410	EMHV8801A	C	5.2.16	Train A BIT Outlet Valve
11ENG03AA	1410	ENHV0006	P	5.2.6	Train A Containment Spray Isolation Valve
11ENG03AB	1410	ENHV0006	C	5.2.6	Train A Containment Spray Isolation Valve
11ENG03AC	1410	ENHV0006	C	5.2.6	Train A Containment Spray Isolation Valve
11ENG03AD	1410	ENHV0006	C	5.2.6	Train A Containment Spray Isolation Valve
11EPG02AA	1410	EPHV8808A	P	5.2.17	Accumulator TEP01A Injection Vlv
11EPG02AB	1410	EPHV8808A	C	5.2.17	Accumulator TEP01A Injection Vlv
11EPG02AE	1410	EPHV8808A	C	5.2.17	Accumulator TEP01A Injection Vlv
11EPG02BA	1410	EPHV8808C	P	5.2.17	Accumulator TEP01C Injection Vlv
11EPG02BB	1410	EPHV8808C	C	5.2.17	Accumulator TEP01C Injection Vlv
11EPG02BE	1410	EPHV8808C	C	5.2.17	Accumulator TEP01C Injection Vlv
11GFG01AA	1410	DSGF02A	P	5.2.18	AFW Pump A Room Cooler
11GFG01AB	1410	DSGF02A	C	5.2.18	AFW Pump A Room Cooler
11GFG01AC	1410	DSGF02A	C	5.2.18	AFW Pump A Room Cooler
11GLG12AA	1410	DSGL15A	P	5.1.1	Trn A Elec Pen Room Cooler
11GNG02AC	1410	DSGN01A	P	5.2.11	Containment Cooler Fan A

Table A-18-4
PFSSD Cables Located in Fire Area A-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GNG02AD	1410	DSGN01A	C	5.2.11	Containment Cooler Fan A
11GNG02AG	1410	DSGN01A	P	5.2.11	Containment Cooler Fan A
11GNG02AH	1410	DSGN01A	C	5.2.11	Containment Cooler Fan A
11GNG02CC	1410	DSGN01C	P	5.2.11	Containment Cooler Fan C
11GNG02CD	1410	DSGN01C	C	5.2.11	Containment Cooler Fan C
11GNG02CG	1410	DSGN01C	P	5.2.11	Containment Cooler Fan C
11GNG02CH	1410	DSGN01C	C	5.2.11	Containment Cooler Fan C
11GNI05AA	1410	GNPT0937	I	5.2.6	Containment Pressure Transmitter
11NGG01AD	1410	NG01BAF1	P	5.2.19	Train A 480 VAC Bus
11NGG01AE	1410	NG01BAF1	P	5.2.19	Train A 480 VAC Bus
11NGG01AJ	1410	NG01TAF1	P	5.2.19	Train A 480 VAC Bus
11NGG01BF	1410	NG03TAF1	P	5.2.19	Train A 480 VAC Bus
11PNG01AE	1410	PN07	P	5.2.19	Non Class IE 120 VAC Instrument
11SES01BB	1410	SE0031	I	5.2.20	Source Range Monitor
11SES01BC	1410	SE0031	I	5.2.20	Source Range Monitor
11SES01BG	1410	SE0031	I	5.2.20	Source Range Monitor
11SES07AC	1410	SENY0060A/B	I	5.2.20	Source Range Monitor
12ABI20FE	1410	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FH	1410	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI21KA	1410	ABPT0515	I	5.2.6	Steam Generator A PT
12ABI21NA	1410	ABPT0525	I	5.2.6	Steam Generator B PT
12ABI21SA	1410	ABPT0535	I	5.2.6	Steam Generator C PT
12ABI21VA	1410	ABPT0545	I	5.2.6	Steam Generator D PT

Table A-18-4
PFSSD Cables Located in Fire Area A-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12ABK01AF	1410	ABHV0005	C	5.2.21	Main Steam Loop 2 to TDAFP
12ABK01BF	1410	ABHV0006	C	5.2.21	Main Steam Loop 3 to TDAFP
12ALI07KD	1410	ALPT0026	I	5.2.22	TDAFP Suction Pressure
12ALI08BA	1410	ALPT0038	I	5.2.22	ESFAS Low Suction Pressure
12FCK23AD	1410	FCHV0312	C	5.2.21	TDAFW Pump Trip and Throttle Valve
12FCK23AR	1410	FCHV0312	P	5.2.21	TDAFW Pump Trip and Throttle Valve
12FCK23AS	1410	FCHV0312	C	5.2.21	TDAFW Pump Trip and Throttle Valve
12FCK24AA	1410	FCFV0313	C	5.2.21	TDAFW Pump Speed-Governing Valve
12FCK24AK	1410	FCFV0313	I	5.2.21	TDAFW Pump Speed-Governing Valve
12SAZ23AA	1410	ABHV0005	C	5.2.21	Status Panel Input
12SAZ23BA	1410	ABHV0006	C	5.2.21	Status Panel Input
13AEI08GB	1410	AELT0503	I	5.2.3	SG C Wide Range Level Transmitter
13AEI08HB	1410	AELT0518	I	5.2.3	SG A Narrow Range Level Transmitter
13AEI08JB	1410	AELT0528	I	5.2.3	SG B Narrow Range Level Transmitter
13AEI08KB	1410	AELT0538	I	5.2.3	SG C Narrow Range Level Transmitter
13AEI08LB	1410	AELT0548	I	5.2.3	SG D Narrow Range Level Transmitter
13BBI16MB	1410	BBPT0457	I	5.2.5 5.2.6 5.2.26	Pressurizer Pressure Transmitter
13GNI05CA	1410	GNPT0935	I	5.2.6	Containment Pressure Transmitter
14ABI20HH	1410	ABPV0004	I	5.2.1	1-hour wrap provided
14ABI21LA	1410	ABPT0516	I	5.2.6	1-hour wrap provided
14ABI21WA	1410	ABPT0546	I	5.2.6	1-hour wrap provided

Table A-18-4
PFSSD Cables Located in Fire Area A-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALI03AJ	1410	ALHV0005	I	5.2.4	1-hour wrap provided
14ALI03AK	1410	ALHV0005	I	5.2.4	1-hour wrap provided
14ALI03AL	1410	ALHV0005	I	5.2.4	1-hour wrap provided
14ALI03BD	1410	ALHV0007	I	5.2.4	1-hour wrap provided
14ALI03BE	1410	ALHV0007	I	5.2.4	1-hour wrap provided
14ALI03BF	1410	ALHV0007	I	5.2.4	1-hour wrap provided
14ALI05AG	1410	ALHV0010	I	5.2.21	1-hour wrap provided
14ALI05AH	1410	ALHV0010	I	5.2.21	1-hour wrap provided
14ALI05AJ	1410	ALHV0010	I	5.2.21	1-hour wrap provided
14ALI05BD	1410	ALHV0012	I	5.2.21	1-hour wrap provided
14ALI05BE	1410	ALHV0012	I	5.2.21	1-hour wrap provided
14ALI05BF	1410	ALHV0012	I	5.2.21	1-hour wrap provided
14ALI07AD	1410	ALFT0001	I	5.2.23	1-hour wrap provided
14ALI07HD	1410	ALPT0024	I	5.2.22	1-hour wrap provided
14ALI08CA	1410	ALPT0039	I	5.2.22	1-hour wrap provided
14ALI09AA	1410	ALFT0007	I	5.2.23	1-hour wrap provided
14ALY09AB	1410	ALHV0005	P	5.2.4	1-hour wrap provided
14ALY09BB	1410	ALHV0007	P	5.2.4	1-hour wrap provided
15BBA01AE	1410	DPBB01A	C	5.2.25	Reactor Coolant Pump A Motor
15BBA01BE	1410	DPBB01B	C	5.2.25	Reactor Coolant Pump B Motor
15BBI19AA	1410	BBPCV0455B	I	5.2.26	Pressurizer Spray Valve
15BBI19BA	1410	BBPCV0455C	I	5.2.26	Pressurizer Spray Valve
15BGK10AA	1410	BGLCV0459	C	5.2.24	Letdown Isolation Valve

Table A-18-4
PFSSD Cables Located in Fire Area A-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15BGK10BA	1410	BGLCV0460	C	5.2.24	Letdown Isolation Valve
15BGK35AB	1410	BGHV8149A	C	5.2.24	Letdown Orifice Isolation Valve
15BGK35BB	1335	BGHV8149B	C	5.2.24	Letdown Orifice Isolation Valve
15BGK35CB	1335	BGHV8149C	C	5.2.24	Letdown Orifice Isolation Valve
15EMK05EA	1410	EMHV8882	C	5.1.2	Boron Injection Downstream Test Line
15EMK05EC	1410	EMHV8882	C	5.1.2	Boron Injection Downstream Test Line

5.2.1 Steam Generator Atmospheric Relief Valves

PFSSD requires at least two steam generator atmospheric relief valves (ARVs) be controlled and the other two closed. The ARVs are normally closed and require air pressure to open. Each valve is controlled by a pressure transmitter input signal from a pressure transmitter installed on the outlet side of the steam generator. The relief valve opens when pressure reaches a designated setpoint.

Cables associated with Steam Generator Atmospheric Relief Valves ABPV0001, ABPV0002 and ABPV0004 are run in area A-18. Cables associated with Steam Generator Atmospheric Relief Valve ABPV0003 are not run in area A-18.

Cable 11ABI20EE runs through area A-18 from ABPY0001 in room 1508 to panel RP053AC in room 3605. Damage to this cable could cause the spurious opening of valve ABPV0001. This cable is run in raceways 111J3A1H and 111J1097, which have been wrapped with a 1-hour fire rated material. This fire wrap, along with automatic fire suppression and detection installed throughout the area, meets the separation requirement of 10CFR50, Appendix R, Section III.G.2.c. Therefore, ARV ABPV0001 is unaffected by a fire in area A-18.

Cable 14ABI20HH runs through area A-18 from ABPT0004 in room 1304 to RP147B in room 3302. Damage to this cable could cause the spurious opening of valve ABPV0004. This cable is run in raceway 114J3C1C, which has been wrapped with a 1-hour fire rated material. This fire wrap, along with automatic fire suppression and detection installed throughout the area, meets the separation requirement of 10CFR50, Appendix R, Section III.G.2.c. Therefore, ARV ABPV0004 is unaffected by a fire in area A-18.

Cable 12ABI20FE runs through area A-18 from ABPY0002 in room 1509 to panel RP147A in room 3302. Cable 12ABI20FH runs through area A-18 from ABPT0002 in room 1305 to RP147A in room 3302. If these cables are damaged, valve ABPV0002 could spuriously open.

If damage occurs to cables associated with ABPV0002, local controller ABFHC0002, located in fire area A-23, can be used to isolate ARV ABPV0002.

Based on the above discussion, manual actions are available to ensure a fire in area A-18 will not prevent the control of two Steam Generator Atmospheric Relief Valves and the closure of the remaining two.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, E-1R1443C, E-1R1444C, DCP 011038, XX-E-013

5.2.2 RCS Hot and Cold Leg Temperature Elements

PFSSD requires RCS hot and cold leg temperature indication on at least one loop to verify flow through the steam generators. The temperature elements used for this purpose are listed in Table A-18-5.

Cables 11BBI15HB (BBTE0413A), 11BBI15LB (BBTE0433B), 11BBI15JB (BBTE0423A) and 11BBI15KB (BBTE0443B) could be damaged by a fire in area A-18. This would cause the loss of at least one temperature indicator on each loop, which is not in accordance with the PFSSD design at Wolf Creek.

Table A-18-5 RCS Hot and Cold Leg Temperature Elements Used for PFSSD	
COMPONENT	**FUNCTION**
BBTE0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	RCS Cold Leg Temperature Element (WR) Loop 4

EMG ES-04, Attachment B, lists alternate indication that may be used to verify cooldown. S/G "A" and S/G "D" pressure instruments ABPT516 and ABPT546 are unaffected by a fire in A-18 due to 1-hour fire wrap provided around the conduit, and can be used per ES-04 to verify heat removal in loops 1 and 4.

The configuration is acceptable because, in the event of fire in fire area A-18, cooldown will be performed using RCS loops A and D. RCS wide range cold and hot leg temperature elements (BBTE413B and BBTE443A) and pressure transmitters ABPT0516 and ABPT0546 will provide indication that cooldown is being achieved.

References: E-15000, E-1R1441, XX-E-013

5.2.3 Steam Generator Level Indication

The decay heat removal function for PFSSD requires the use of two RCS loops and two Steam Generators. Steam generator (SG) level indication is required to support this function. A fire in A-18 uses MDAFW pump B, which is normally aligned to supply SGs A and D.

Steam generator A wide range level transmitter AELT0501 is unavailable due to a fire in area A-18. Steam generator A narrow range level transmitters AELT0518 and AELT0551 are unavailable due to a fire in area A-18. Steam generator A narrow range level transmitters AELT0517 and AELT0519 are unaffected by a fire in area A-18. Therefore, Steam Generator A level indication is assured.

Steam generator D narrow range level transmitters AELT0548 and AELT0554 are unavailable due to a fire in area A-18. Steam generator D narrow range level transmitters AELT0547 and AELT0549 are unaffected by a fire in area A-18. Also, steam generator D wide range level transmitter AELT0504 is unaffected by a fire in area A-18. Therefore, Steam Generator D level indication is assured.

References: E-15000, XX-E-013, E-1F9203

5.2.4 Motor Driven Auxiliary Feedwater Pump Discharge Valves

PFSSD for a fire in area A-18 relies on Motor Driven Auxiliary Feedwater Pump (MDAFP) B to provide feedwater to steam generators A and D. Circuits for all four MDAFP discharge valves are run through area A-18. However, circuits associated with ALHV0005 and ALHV0007 are wrapped with 1-hour fire rated material. In addition, area A-18 is provided with automatic detection and suppression throughout. This configuration meets the requirements of Wolf Creek's commitments to 10CFR50, Appendix R Section III.G.2.c.

Based on the above discussion, a fire in area A-18 will not affect the ability to supply auxiliary feedwater from MDAFP B through valves ALHV0007 and ALHV0005 to steam generators A and D, respectively.

References: E-15000, E-13AL03A, E-13AL03B, E-13AL09, DCP 011038

5.2.5 Pressurizer Power Operated Relief Valves and Associated Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed. Cables for PORV BBPCV0455A and its associated block valve BBHV8000A run through fire area A-18. Cables and components associated with PORV BBPCV0456A and associated block valve BBHV8000B are not located in area A-18.

The pressurizer PORVs are not considered high/low pressure interfaces. The valves are supplied power by an ungrounded 125 VDC system. Therefore, based on GL 86-10, consideration of multiple proper polarity hot shorts is not required. A single proper polarity hot short still needs to be considered.

Cables 11BBK40AG and 11BBK40AJ associated with PORV BBPCV0455A are run in this area. Based on a review of drawing E-13BB40, it would take two concurrent proper polarity hot shorts to cause the PORV to spuriously open. Therefore, a fire in area A-18 is not postulated to open PORV BBPCV0455A due to damage to the control cables associated with the PORV.

Instrument cables 11BBI16KB and 13BBI16MB associated with pressurizer pressure transmitters BBPT0455 and BBPT0457 are run in fire area A-18. As discussed in Calculation XX-E-013, Appendix 1, the Ovation pressurizer pressure control system uses 4-channel verification from all four pressurizer pressure transmitters to operate the pressurizer PORVs. Failure of a single channel will not cause the spurious operation of the PORVs since the system uses the 2nd highest input as the validated signal. Damage to two channels will not cause the PORVs to open because both channels would have to fail to the exact same value at the exact same time and therefore this failure mode is not credible.

Based on the above discussion, a fire in area A-18 will have no impact on the pressurizer PORVs.

References: E-15000, XX-E-013, E-13BB16, E-13BB39, E-13BB40, E-1F9301, M-12BB02, M-744-00028, M-761A-00063, CR 13079, DCP 12944, DCP 13324.

5.2.6 Safety Injection and Containment Spray

Calculation XX-E-013, Appendix 1 (PFSSD Support Section) provides a detailed discussion about the potential PFSSD impact of a spurious safety injection signal (SIS) and spurious containment spray actuation signal (CSAS). This section discusses the specific PFSSD impact if a fire occurs in this area.

Containment pressure transmitters GNPT0935 and GNPT0937 and associated cables are located in area A-18. Cables for containment pressure transmitters GNPT0934 and GNPT0936 are not run in area A-18. Consequently, a spurious CSAS due to high containment pressure can occur if a fire occurs in area A-18. A spurious SIS due to high containment pressure cannot occur since only one out of three containment pressure SIS initiators are located in area A-18.

Power and control cables associated with Train A containment spray isolation valve ENHV0006 are run in fire area A-18. Damage to these cables could cause the valve to spuriously open. As stated in the previous paragraph, a spurious CSAS is credible if a fire occurs in this area. Therefore, a spurious containment spray condition could occur.

Cables associated with BBPT0455 and BBPT0457 are run in area A-18. Cables associated with BBPT0456 and BBPT0458 are not run in area A-18. Consequently, a fire in area A-18 could cause a spurious SIS due to damage to cables associated with two of the four pressurizer pressure transmitters.

Cables associated with steam line pressure transmitters ABPT0515, ABPT0516, ABPT0525, ABPT0535, ABPT0545 and ABPT0546 are run in area A-18. Cables associated with ABPT0516 and ABPT0546 are wrapped with a 1-hour fire rated material. Consequently, the two out of three logic for low steam line pressure initiation of SIS cannot be satisfied if a fire occurs in area A-18.

A spurious SIS starts the charging sequence which starts the CCPs and opens the BIT flowpath valves. For a fire in this area, Train B CCP is credited for PFSSD since a number of Train A PFSSD components could be lost. Train B BIT flowpath valves EMHV8801B and EMHV8803B are unaffected and would open on a SIS. The Train B RWST to CCP suction header valve BNLCV0112B is unaffected and would open on a SIS. Also, the Train B CCP mini flow valve BGHV8111 is unaffected and Train B CCW flow to the seal water heat exchanger is unaffected to ensure cooling of the recirc flow, RCP seal return and CCP oil cooler. Therefore, the Train B charging pump will not be affected by a spurious SIS caused by a fire in this area.

A start of the credited CCW system (Train B) will not adversely impact the system. The Train B ESW system is unaffected and will start on a spurious SIS, providing necessary cooling water to the CCW heat exchanger.

A start of the AFW pumps will not adversely impact PFSSD. The Train B AFW pump is credited for a fire in this area. Suction from the CST to the Train B AFW pump is unaffected. Discharge flow will either return to the CST or flow to the steam generators through the discharge control valves. Therefore, the Train B AFW pump is unaffected by a spurious SIS caused by a fire in this area.

A start of the RHR pumps due to a spurious SIS will not adversely impact either pump. The RWST supply to the pumps is not affected unless Train A containment sump valve EJHV8811A spuriously opens, in which case BNHV8812A will automatically close, causing a loss of suction and damage to the Train A RHR pump. Train B containment sump valve EJHV8811B is unaffected and will not spuriously open. Component cooling water is available

to the Train B RHR heat exchanger. Therefore, the Train B RHR pump will not be affected by a spurious SIS caused by a fire in this area.

A spurious Containment Spray Actuation Signal (CSAS) due to spurious high containment pressure can be mitigated by placing CS pump control hand switches ENHIS0003 and ENHIS0009 in pull-to-lock. These switches are located on control room panel RL017. Indication in the Control Room for SI and CS pump operation is unaffected by a fire in A-18.

Based on the above discussion, a spurious SIS and CSAS can occur if a fire occurs in this area. Credited PFSSD equipment will not be damaged by the spurious SIS. The CSAS can be terminated from the control room. Therefore, a spurious SIS and CSAS will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13AB21, E-13BB16, E-13EM01, E-13EN01, E-13EN03, E-13GN05, E-1F9431, M-12AB01, M-12BB02, M-12BN01, M-12EJ01, M-12GN01, OFN KC-016

5.2.7 Pressurizer Level Transmitters

PFSSD requires pressurizer level indication to be available. Pressurizer level indication is provided by level transmitters BBLT0459 and BBLT0460. Cables associated with BBLT0459, that run through A-18, are summarized in Table A-18-4. Cables associated with BBLT0460 do not run through fire area A-18 and are unaffected by a fire in area A-18.

Therefore, pressurizer level indication is available for a fire in area A-18 using BBLT0460/BBLI0460A.

References: E-15000, E-1F9301, E-13BB16

5.2.8 Reactor Head Vent Valves

PFSSD requires that one of the two reactor vessel head vent valves on each flow path (2 flow paths total) be closed to prevent loss of inventory and uncontrolled depressurization of the RCS. Cables for two of the four head vent valves run through area A-18. The head vent valves are considered high-low pressure interfaces, so consideration of multiple proper polarity hot shorts is required.

Cables for head vent valves BBHV8001B and BBHV8002B are not run through A-18. Therefore, isolation of the separation group 4 flow path is assured. Either BBHV8001A or BBHV8002A needs to be closed to prevent RCS depressurization through the separation group 1 head vent flow path.

Cable 11BBK30AA is run in cable tray through area A-18 and enters containment penetration assembly ZNE277. The cable tray and penetration assembly contain multiple 125 VDC cables that could present a source for 125 VDC power to energize the valve. An intra-cable short in cable 11BBK30AA would not cause the valve to open because this failure mode would not energize the control solenoid. However, a fire that affects the cable tray and containment penetration assembly ZNE277 could cause a single or multiple proper polarity inter-cable hot short that would open valve BBHV8001A.

Cable 11BBK30CA associated with valve BBHV8002A is run in conduit through area A-18 and enters containment penetration assembly ZNE278. The conduit carries one other cable (11BGK48CB) which is a control cable for excess letdown isolation valve BGHV8153A and is normally de-energized. The containment penetration assembly contains multiple 125 VDC cables that could present a source of 125 VDC power to energize and open the valve. An intra-cable short in cable 11BBK30CA would not cause the valve to open because this failure

mode would not energize the control solenoid. However, a fire that affects containment penetration assembly ZNE278 could cause a single or multiple proper polarity inter-cable hot short that would open valve BBHV8002A.

Based on this discussion, the Train A reactor head vent valves could open if a fire occurs in area A-18. This would cause a loss of RCS inventory that is within the makeup capability of the charging pumps. Therefore, spurious opening of the Train A RCS head vent flowpath will not adversely impact PFSSD.

References: E-15000, E-1F9301, M-12BB04, E-13BB30, E-1R1413D, E-1R1423A, E-1R1423C, E-1R1433A, E-1R1433B

5.2.9 Charging Flow to Regenerative Heat Exchanger Isolation Valves

PFSSD requires charging flow to be directed to the RCP seals. To ensure adequate flow to the RCP seals, flow diversion to the regenerative heat exchanger needs to be prevented. Valves BGHV8105 and BGHV8106 are included in the PFSSD equipment list to accomplish this task. Manual valve BG8402B is also included to provide an alternate means of closing this flow path during alternate safe shutdown using OFN RP-017.

Cables associated with BGHV8106 are run in area A-18 and could be damaged by a fire in this area, preventing valve BGHV8106 from being closed from the control room. However, cables associated with valve BGHV8105, and its hand switch (BGHIS8105), are unaffected by a fire in area A-18. Therefore, valve BGHV8105 can be used to isolate flow to the regenerative heat exchanger and therefore satisfy the PFSSD requirement.

References: E-15000, XX-E-013, E-1F9102, E-13BG11A, M-12BG03

5.2.10 Excess Letdown Isolation Valves

PFSSD requires the excess letdown path be isolated to prevent loss of inventory and uncontrolled depressurization of the RCS. To accomplish this, either normally closed valve BGHV8153A or BGHV8154A must be maintained closed and either normally closed valve BGHV8153B or BGHV8154B must be maintained closed. Valves BGHV8153B and BGHV8154B are unaffected by a fire in area A-18.

Cable 11BGK48CB associated with valve BGHV8153A is run in conduit through area A-18 and enters containment penetration assembly ZNE278. The conduit carries one other cable (11BBK30CA), which is a control cable for RCS head vent valve BBHV8002A and is normally de-energized. The containment penetration assembly contains multiple 125 VDC cables that could present a source of 125 VDC power to energize and open the valve. An intra-cable short in cable 11BGK48CB would not cause the valve to open because this failure mode would not energize the solenoid. However, a fire that affects containment penetration assembly ZNE278 could cause a single or multiple proper polarity inter-cable hot short that would open valve BGHV8153A.

Cable 11BGK48DB associated with valve BGHV8154A is run in cable tray through area A-18 and enters containment penetration assembly ZNE277. The cable tray and penetration assembly contain multiple 125 VDC cables that could present a source for 125 VDC power to energize the valve. An intra-cable short in cable 11BGK48DB would not cause the valve to open because this failure mode would not energize the control solenoid. However, a fire that affects the cable tray and containment penetration assembly ZNE277 could cause a single or multiple proper polarity inter-cable hot short that would open valve BGHV8154A .

Based on this discussion, the Train A excess letdown flow path could open if a fire occurs in area A-18. This would cause a loss of RCS inventory that is within the makeup capability of

the charging pumps. Calculation WCNOC-CP-002 shows that a failed open excess letdown flowpath does not need to be mitigated. Therefore, spurious opening of the Train A excess letdown flow path will not adversely impact PFSSD.

References: E-15000, E-1F9301, M-12BG01, E-13BG48, E-1R1413D, E-1R1423A, E-1R1423C, E-1R1433A, E-1R1433B, WCNOC-CP-002

5.2.11 Containment Air Coolers

PFSSD requires at least one Train of containment air coolers. Valves EFHV0031, EFHV0033, EFHV0045 and EFHV0049 are associated with Train A containment air coolers SGN01A and SGN01C. All four valves are required to be open to ensure a supply of Essential Service Water (ESW) to the containment air coolers. As shown in Table A-18-4, circuits for all four valves are run in area A-18 and may be damaged by a fire, causing loss of control of these valves.

A fire in area A-18 uses train B containment air coolers SGN01B and SGN01D. Valves EFHV0032, EFHV0034, EFHV0046 and EFHV0050 control
ESW flow to the Train B containment air coolers. Circuits for these valves are run in a different fire area and are unaffected by a fire in area A-18. Therefore, ESW flow to/from Train B containment air coolers SGN01B and SGN01D will be available.

Power and control circuits for containment air coolers SGN01A and SGN01C are run in area A-18. Power and control circuits for containment air coolers SGN01B and SGN01D are run in a separate fire area and are unaffected by a fire in area A-18.

Based on the above discussion, Train B containment air coolers SGN01B and SGN01D are unaffected by a fire in area A-18.

References: E-15000, E-1F9403, E-1F9441, E-13EF07, E-13EF08, E-13EF09, E-13GN02

5.2.12 Thermal Barrier Cooling

The Wolf Creek plant design provides two redundant methods of cooling the RCP seals, thermal barrier cooling using CCW and seal injection using the CCP. The PFSSD methodology at Wolf Creek requires tripping the RCPs and performing a natural circulation cooldown upon loss of both thermal barrier cooling (TBC) and seal injection. If only one method is lost, continued operation of the RCP is allowed by present established procedures until the other method can be re-established.

Valves BBHV0013, BBHV0014, BBHV0015, BBHV0016, EGHV0058, EGHV0126 and EGHV0132 provide isolation capability for CCW flow to/from the RCP thermal barriers. Cables associated with these components are located in area A-18. If the valves fail to the open position, CCW would continue to flow to the RCP components, including the thermal barrier. This continued flow of water will not adversely impact PFSSD. If the valves fail to the closed position, CCW flow to the thermal barrier could be lost. This is acceptable since RCP seal injection is available.

Flow transmitters BBFT0017, BBFT0018, BBFT0019 and BBFT0020 are associated with valves BBHV0013, BBHV0014, BBHV0015 and BBHV0016, respectively. The flow transmitters monitor flow in the CCW piping and shut the valves on high CCW flow. Cables associated with these flow transmitters are run in this area. Damage to these cables could cause a spurious high CCW flow signal and close the valves. Damage to the valve cables could prevent re-opening the valves.

Loss of thermal barrier cooling would be indicated in the control room as a reduction in flow on flow indicators EGFI0128 and EGFI0129. Therefore, operators can diagnose a loss of thermal barrier cooling.

Based on the above discussion, a fire in area A-18 could affect CCW flow to/from the RCP thermal barriers. RCP seal injection is unaffected.

References: E-15000, XX-E-013, E-13BB03, E-13BB28, E-13EG09, E-13EG17A, E-13EG18, E-1F9303, M-12BB03, M-12EG03

5.2.13 RCS to RHR Isolation Valves

PFSSD requires isolation of the RCS to RHR pump flow path during hot standby and opening of this flow path when initiating RHR. RHR Train B is used for a fire in area A-18. Cables for EJHV8701A (Train A) and EJHV8701B (Train B) are run through area A-18. Damage to these cables could cause the associated valve to spuriously open or prevent operation of the valve from the control room.

During hot standby, redundant valves BBPV8702A and BBPV8702B are unaffected by a fire in area A-18 and are available to ensure the RCS to RHR flow path remains isolated. This will also ensure the RCS does not drain to the containment sump if valves EJHV8811A or EJHV8811B were to spuriously open.

When transitioning to RHR Train B for cold shutdown decay heat removal, valves EJHV8701B and BBPV8702B need to be open. Valve BBPV8702B is unaffected by the fire and can be opened from the control room. To open EJHV8701B, a cold shutdown repair is needed or a containment entry made to open the valve. Cold shutdown repairs and local operator actions performed within 72 hours are allowed per Wolf Creek's commitments to 10CFR50, Appendix R, Section III.G.1.

References: E-15000, XX-E-013, USAR, M-12EJ01, M-12BB01, E-13EJ05A, E-13EJ05B

5.2.14 Containment Sump Isolation Valves

PFSSD requires that loss of inventory to the containment sump be prevented. Section 5.2.13 shows that loss of RCS inventory to the containment sump is prevented by maintaining valves BBPV8702A and BBPV8702B closed during hot standby.

Circuits for EJHV8811A are run through area A-18. Damage to these circuits could cause valve EJHV8811A to spuriously open. However, this valve is on the Train A side which is not used for a fire in area A-18. Valve BBPV8702A is maintained closed when operating the Train B RHR system. Therefore, loss of RCS inventory through valve EJHV8811A is prevented by maintaining valve BBPV8702A closed.

Draindown of the RWST to the containment sump also needs to be prevented. If valve EJHV8811A were to spuriously open and valve BNHV8812A stays open, the RWST will drain to the containment sump. Circuits for BNHV8812A are not run through area A-18. If valve EJHV8811A fully opens, valve BNHV8812A will automatically close, preventing draindown of the RWST to the containment sump. If valve EJHV8811A spuriously opens but stalls before reaching full open position, valve BNHV8812A will not automatically close. If this occurs, operators will recognize a decreasing RWST level using any of the four RWST level indicators and take action to close BNHV8812A using BNHIS8812A in the main control room.

Circuits for EJHV8811B are run in a separate fire area and are unaffected by a fire in area A-18. Therefore, loss of RCS and RWST inventory to the containment sump through valve EJHV8811B is prevented.

References: E-15000, E-13BN03, E-13EJ06A, E-13EJ06B, XX-E-013, M-12BN01, M-12EJ01, E-1F9205, E-1F9301

5.2.15 RHR Discharge Valves

PFSSD requires the discharge valves on the operating RHR Train be open to provide RHR flow to the RCS cold leg via the accumulator injection lines. Train B RHR is used for a fire in area A-18; therefore, valves EJHCV0607 and EJHV8809B need to be open during RHR.

Circuits for valve EJHV8809A (Train A) are run through area A-18. Circuits for EJHCV0607 and EJHV8809B are located in a different fire area and are unaffected by a fire in area A-18.

Therefore, RHR Train B outlet valves EJHCV0607 and EJHV8809B are available for a fire in area A-18.

References: E-15000, M-12EJ01, M-12EP01, E-13EJ09A

5.2.16 Boron Injection Tank Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

A fire in area A-18 uses CCP B since circuits for CCP A may be affected by the fire. Also, a fire in area A-18 has the possibility to cause a loss of inventory through the letdown flow path until the letdown isolation valves can be failed closed. In addition, a loss of inventory could occur due to spurious opening of the Train A reactor head vent valves (Section 5.2.8) and the Train A excess letdown valves (Section 5.2.10). Therefore, charging through the BIT flow path may be required for hot standby. In addition, as discussed above, the BIT flowpath is required for transition to cold shutdown.

To ensure a flow path from CCP B is available, BIT inlet valve EMHV8803B must be open and either BIT outlet valve EMHV8801A or EMHV8801B must be open. Cables for valves EMHV8803B and EMHV8801B are not run through area A-18 and are unaffected by the fire.

Therefore, CCP B to RCS flow path through the BIT is assured for a fire in area A-18.

References: E-15000, E-13EM02, E-13EM02A, E-13EM02B, E-13EM02C, M-12EM02

5.2.17 Safety Injection Accumulator Isolation Valves

PFSSD requires isolation of the SI accumulators prior to reducing RCS pressure below the injection pressure to avoid unnecessary accumulator discharge. This is accomplished by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. These valves are normally open with the MCC breaker locked in the open position. Cables for valves EPHV8808A and EPHV8808C are run in area A-18 and are listed in Table A-18-4.

Since the breakers for these valves are normally open, damage to these cables will not cause the valve to spuriously change position. However, damage to the cables will prevent closing the associated valve from the control room after power is restored.

The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig. If necessary, a containment entry can be made to manually close the valves.

A fire in area A-18 may require a containment entry to close valves EPHV8808A and EPHV8808C if these valves are unresponsive from the control room.

References: E-15000, M-12EP01, E-13EP02A. XX-E-013

5.2.18 Auxiliary Feedwater Pump Room Coolers

PFSSD requires the operating train auxiliary feedwater pump room cooler to be available. A fire in area A-18 uses AFW Train B to supply feedwater to the steam generators.

Cables associated with Train A room cooler SGF02A are run through area A-18. Damage to these cables could prevent the operation of SGF02A. Cables associated with Train B room cooler SGF02B are run through a separate area and are unaffected by a fire in area A-18.

Auxiliary Feedwater Pump B room cooling is assured for a fire in area A-18 using SGF02B and Train B ESW.

References: E-15000, E-13GF01, M-12GF01

5.2.19 PFSSD Equipment Power Availability

PFSSD requires that one train of electrical systems required to power PFSSD components be available and unaffected by a fire. Cables that, if damaged, could result in a loss of power to the associated bus are run in fire area A-18.

Damage to cables 11NGG01AD and 11NGG01AE will cause a loss of power to 480 VAC MCC NG01B. Damage to cable 11NGG01AJ will cause a loss of power to 480 VAC MCC NG01T. Damage to cable 11NGG01BF will cause a loss of power to 480 VAC MCC NG03T. If this occurs, a number of Train A PFSSD components will be lost.

Cables for redundant Train B MCCs NG02B, NG02T and NG04T are unaffected by a fire in area A-18. Therefore, a fire in area A-18 will not disrupt power availability to required Train B PFSSD components.

Damage to cable 11PNG01AE will cause a loss of one of the two sources of power to non-class 1E 120 VAC distribution panel PN07. However, cables associated with the alternate power source from PG19GFR3 are unaffected. Therefore, PN07 will remain available to energize its respective PFSSD loads.

Both sources of power to non-class 1E 120 VAC distribution panel PN08 are unaffected by a fire in this area. Therefore, panel PN08 is available to supply its respective PFSSD loads.

References: E-15000, XX-E-013, E-1F9421, E-1F9426, E-03NG01, E-13PN01, E-13PN01A

5.2.20 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B. Cables run in fire area A-18 associated with these monitors are listed in Table A-18-4.

Cables for SENE0031 and SENY0060A/B run in area A-18. Cables for SENE0032 and SENY0061A/B do not run in area A-18 and are unaffected by a fire in area A-18.

Source range monitoring is available for a fire in area A-18 using SR monitors SENE0032 and SENY0061A/B.

For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013, Attachment 3.

References: E-15000, E-13SE01, E-13SE07, XX-E-013

5.2.21 Turbine Driven Auxiliary Feedwater Pump (TDAFP)

To prevent uncontrolled cooldown through the TDAFP, valves ABHV0005 and ABHV0006 or valves FCHV0312 or FCHV0313 are required to be closed. Valve FCHV0312 is located downstream of valves ABHV0005 and ABHV0006 in the 4-inch steam line to PAL02. This valve is normally closed and will prevent uncontrolled blowdown if valves ABHV0005 or ABHV0006 were to spuriously open. Valve FCHV0313 is located downstream of valve FCHV0312. This valve controls steam pressure entering the TDAFP turbine to control pump speed.

Cables associated with ABHV0005, ABHV0006, FCHV0312 and FCFV0313 are run in area A-18. Damage to cables associated with these valves could cause all four valves to spuriously open at the same time, causing uncontrolled blowdown through the TDAFP. If this occurs, the TDAFP would trip on high speed and valve FCFV0313 would mechanically shut, isolating the blowdown path.

Uncontrolled blowdown through the TDAFP is avoided by FCFV0312 automatically closing due to TDAFP high speed.

References: E-15000, E-1F9101, M-12FC02, M-12AB02, E-13FC23, E-13AB01, E-13AB01A, E-13FC23, E-13FC24, E-13AL05A, E-13AL05B, E-13SA23, XX-E-013

5.2.22 Auxiliary Feedwater Pump Pressure Transmitters

PFSSD requires at least one train of AFW be available to supply feedwater to at least two steam generators. A fire in area A-18 uses Train B AFW pump. Cables associated with AFW pressure transmitters, run through area A-18, are discussed in this section.

The normal PFSSD supply of water to the AFW pumps is from the Condensate Storage Tank (CST). Three pressure transmitters (ALPT0037, ALPT0038 and ALPT0039) are located on the CST supply to the AFW pumps and are used to indicate CST pressure in the control room. In addition, these pressure transmitters initiate switchover to ESW if 2 out of 3 transmitters read low CST pressure. If necessary, CST level can be calculated manually using CST pressure.

Cables associated with pressure transmitter ALPT0037 are not run in area A-18. Cable 12ALI08BA is an instrument cable associated with pressure transmitter ALPT0038 and is run through area A-18. Damage to this cable will not prevent operation of the B Train AFW pump. Cable 14ALI08CA is an instrument cable associated with pressure transmitter ALPT0039. This cable is run in conduit 114J3C1C, which has been wrapped with a 1-hour fire rated material in area A-18. Consequently, there is reasonable assurance that a fire in area A-18 will not cause damage to cable 14ALI08CA and a spurious switchover to ESW will not occur.

Cable 12ALI07KD is an instrument cable associated with pressure transmitter ALPT0026. This pressure transmitter is located on the suction side of the TDAFP. A spurious signal on this pressure transmitter circuit will not prevent operation of the B Train AFW pump.

Cable 14ALI07HD is an instrument cable associated with pressure transmitter ALPT0024. This pressure transmitter is located on the suction side of the B MDAFP, which is required for a fire in area A-18. This cable is run in conduit 114J3C1C which has been wrapped with a 1-hour fire rated material. Consequently, there is reasonable assurance that a fire in area A-18 will not cause damage to cable 14ALI07HD.

Based on this discussion, damage to cables associated with ALPT0026 and ALPT0038 will not prevent AFW supply to the steam generators.

References: E-15000, XX-E-013, E-1F9202, E-1F9204, M-12AL01, E-13AL07B, E-13AL08

5.2.23 Auxiliary Feedwater Flow Transmitters

PFSSD requires flow to at least two steam generators be established. As stated previously, the Train B AFW flow path is available to supply feedwater to Steam Generators A and D.

Flow indication in the control room is necessary to ensure required flow to the steam generators. Flow transmitters ALFT0001 and ALFT0007 measure flow to Steam Generators D and A, respectively and indicate in the control room.

Cables associated with ALFT0001 and ALFT0007 are run in area A-18. These cables are run in conduit 114J3C1C in area A-18 which has been wrapped with a 1-hour fire rated material. In addition, area A-18 is provided with automatic detection and suppression throughout. This configuration meets the requirements of Wolf Creek's commitments to 10CFR50, Appendix R Section III.G.2.c.

A fire in area A-18 will not affect AFW to steam generator A and D flow transmitters ALFT0007 and ALFT0001 nor prevent AFW to steam generator flow indication in the control room.

References: E-15000, E-1F9204, M-12AL01, E-13AL07B, E-13AL09, DCP 011038

5.2.24 Letdown Isolation Valves

Letdown isolation valves BGLCV0459 and BGLCV0460 are isolation valves installed in series on the inlet side of the regenerative heat exchanger. PFSSD requires that either of these valves be closed.

15BGK10AA is a power/control cable for the BGLCV0459 solenoid valve (BGHY0459). Air supplied by an open (energized) solenoid valve will open valve BGLCV0459. A closed (de-energized) solenoid valve will cause loss of air pressure and closure of valve BGLCV0459.

15BGK10BA is a power/control cable for the BGLCV0460 solenoid valve (BGHY0460). Air supplied by an open (energized) solenoid valve will open valve BGLCV0460. A closed (de-energized) solenoid valve will cause loss of air pressure and closure of valve BGLCV0460.

Either BGLCV0459 or BGLCV0460 must be closed or letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C must be closed. The cables for BGLCV0459 and BGLCV0460 are routed in a common enclosure in cable trays. A hot short on the cables could cause the valves to open. A hot short on 15BGK10AA and 15BGK10BA prevents closing BGLCV0459 and BGLCV0460 from the control room. Other cables routed in the cable trays have the proper voltage for hot shorts. The hot shorts bypass MCB hand switches for BGLCV0459 and BGLCV0460. BGLCV0459 and BGLCV0460 constitute a high/low pressure interface, so multiple simultaneous hot shorts of the proper polarity was considered.

Letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C are listed as PFSSD components because of the interlock between these valves and BGLCV0459 and BGLCV0460. The interlock prevents closure of the letdown valves when any one or more orifice isolation valves are open. Cables associated with all three letdown orifice isolation valves are located in this fire area. Damage to these cables could prevent closure of the valves from the control room. Therefore, a fire in area A-18 will prevent closure of all three letdown orifice isolation valves (BGHV8149A, BGHV8149B, and BGHV8149C) as well as the two letdown isolation valves (BGLCV0459 and BGLCV0460).

BGHV8152 is located in the low-pressure piping rated for only 600 psi pressure down stream of BGLCV0459 and BGLCV0460. Isolating BGHV8152 with the reactor pressure above 600 psi will cause relief valve BGV8117 to open to protect the pipe, and discharge the water to the PRT. A maximum of 195 gpm can be passed through the three orifice isolation valves if they are all open. The centrifugal charging pump capacity is 150-gpm. Therefore approximately 45-gpm could be potentially lost while BGLCV0459 and BGLCV0460 remain open.

Valves BGLCV0459 and BGLCV0460 are air operated and fail in the closed position. The valves are located in containment. Instrument air to containment is controlled by valve KAFV0029, which is unaffected by a fire in area A-18. Therefore, hand switch KAHIS0029 can be used to close the valve from the control room and isolate instrument air to containment. Pressurizer level indication is available using BBLI0460A.

Based on the above discussion, letdown valves BGLCV0459 and BGLCV0460 can be closed from the control room if a fire occurs in area A-18.

References: E-15000, XX-E-013, E-13BG10, E-13BG35, E-13KA02, E-1R1444B, E-1R1444C, E-1F9301, M-12BG01, M-12KA01

5.2.25 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs.

One control cable associated with reactor coolant pumps A and B is run in fire area A-18. Damage to these cables in the event of a fire could prevent operators from stopping the A and B RCPs from the control room. However, a fire in A-18 will not cause a loss of all seal cooling since RCP seal injection remains available.

Based on the above discussion, the inability to trip the A and B RCPs from the control room will have no adverse impact on PFSSD. The pumps can continue to operate, providing forced flow circulation. If the pumps spuriously stop, natural circulation cooldown can be used.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1

5.2.26 Normal Pressurizer Spray

The normal pressurizer spray valves are included in the PFSSD design because spurious operation of pressurizer sprays can cause a decrease in pressure which can lead to boiling in the core. The pressurizer spray valves are part of the pressurizer pressure control system.

The pressurizer normal spray valves (BBPCV0455B and BBPCV0455C) operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

Instrument cables 11BBI16KB and 13BBI16MB associated with pressurizer pressure transmitters BBPT0455 and BBPT0457 are run in fire area A-18. As discussed in Calculation XX-E-013, Appendix 1, the Ovation pressurizer pressure control system uses 4-channel verification from all four pressurizer pressure transmitters to operate the pressurizer spray system. Failure of a single channel will not cause the spurious operation of the spray valves since the system uses the 2nd highest input as the validated signal. Damage to two channels will not cause the spray valves to open because both channels would have to fail to the exact same value at the exact same time and therefore this failure mode is not credible.

Cable 15BBI19AA associated with pressurizer spray valve BBPCV0455B, and cable 15BBI19BA associated with pressurizer spray valve BBPCV0455C are run in this area. Damage to these cables could cause the spurious opening of the spray valves.

The pressurizer spray valves are electro/pneumatic operated and loss of air pressure will close the valves. The air supply comes from the compressed air system. Closing valve KAFV0029 using KAHIS0029 on RL024 will isolate compressed air to containment which will cause the pressurizer spray valves to close or prevent them from opening. Based on WCNOC-CP-002, spray flow needs to be stopped within 50 minutes. Since this is a control room action, this can be completed well within 50 minutes.

Based on the above discussion, the pressurizer spray valves could spuriously open if a fire occurs in this area. Pressurizer spray can be stopped by closing valve KAFV0029 from the main control room. Pressurizer pressure indication is available using BBPI0456 and BBPI0458.

References: E-15000, XX-E-013, E-13BB19, E-13KA02, M-744-00028, M-761A-00063, DCP 13324

FIRE AREA A-19

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-19 is located on the 2047 elevation of the Auxiliary Building and includes the rooms listed in Table A-19-1.

Table A-19-1
Rooms Located in Fire Area A-19

ROOM #	DESCRIPTION
1504	Containment Purge Exhaust & Mech Equipment Room
1506	Containment Purge Supply Air Handling Unit Room
1513	Control Building Ventilation Supply A/C Unit Room

Fire area A-19 has no fixed automatic suppression installed. The area is provided with automatic fire detection throughout.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-19-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-19-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-19

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Steam generator A ARV ABPV0001 could spuriously open. If necessary, fail the valve closed by closing valves KAV1435 (air) and KAV1364 (nitrogen) and bleeding air from the regulator.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
AL	Aux. Feedwater System	H, P	Train A MDAFP may not be available. Train B MDAFP is available using either the CST or ESW as the suction source. The TDAFP is available using Train B ESW as the suction source. The suction from the CST and Train A ESW may be affected. The TDAFP can be lined up to any of the four steam generators.
AP	Condensate Storage System	H	The CST is available to supply AFW to the Train B MDAFP only.
BB	Reactor Coolant System	R, M, H, P, S	Power to valves BBPV8702A and BBPV8702B could be lost. If necessary, perform a cold shutdown repair to restore power or make a containment entry to manually open the required valve. RCP thermal barrier cooling could be affected due to spurious closure of BBHV0013, BBHV0014, BBHV0015 and BBHV0016. RCP seal injection is available.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
BN	Borated Refueling Water Storage System	R, M, H	Level transmitters BNLT0930, BNLT0931 and BNLT0932 may be affected. Level transmitter BNLT0933 is available. A fire-induced SIS will not occur so a spurious low-low level in the RWST will not cause a draindown of the RWST into the containment sump.
EF	Essential Service Water System	H, S	Both trains of ESW are available except that the Train A ESW to Train A CCW heat exchanger flowpath may be affected.

Table A-19-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-19

System	System Name	PFSSD Function*	Comments
EG	Component Cooling Water System	S	The Train A CCW system may be affected. The Train B CCW system is unaffected by a fire in this area. Valves EGHV0061, EGHV0127 and EGHV0133 could be affected, potentially causing a loss of thermal barrier cooling. CCW flow indicators EGFI0128 and EGFI0129 are unaffected. Valve EGHV0101 could spuriously open or may not open when operating Train A RHR. Valve EGHV0102 is unaffected.
EJ	Residual Heat Removal System	M, H, P	The Train A RHR system may be affected. The Train B RHR system is unaffected by a fire in this area. Containment sump isolation valves EJHV8811A and EJHV8811B could spuriously open, causing a draindown path from the RWST to the containment sump. Valves BNHV8812A and BNHV8812B will automatically close, as designed, when EJHV8811A and EJHV8811B, respectively, reach full open position, mitigating draindown. However, if either EJHV8811A or EJHV8811B stall before reaching full open position, BNHV8812A or BNHV8812B will not automatically close. In this case, operators can close BNHV8812A and BNHV8812B using BNHIS8812A and BNHIS8812B, respectively, in the main control room.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
EP	Safety Injection Accumulators	H	Power to SI accumulator tank valves EPHV8808B and EPHV8808D could be affected. Prior to the RCS reaching 1000 psi, it may be necessary to make a containment entry to close the valves or bleed nitrogen from the accumulator to prevent injection.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
GK	Control Room and Class 1E Switchgear Room Coolers	S	Train A control room A/C unit SGK04A may be affected. Train B control room A/C unit SGK04B is unaffected by a fire in this area.

Table A-19-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-19

System	System Name	PFSSD Function*	Comments
GL	Auxiliary Building HVAC	S	Train A CCW room cooler SGL11A may be affected. Train B CCW room cooler SGL11B is unaffected by a fire in this area.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
GN	Containment Coolers	S	Train B containment coolers could be affected. Train A containment coolers are unaffected. Containment pressure transmitter GNPT0934 may be affected. The remaining containment pressure transmitters are unaffected.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
NG	480V Load Centers and MCCs	S	Train A and B 480 VAC MCCs could be affected. See Section 5.2.7 for complete discussion.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.

Table A-19-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-19

System	System Name	PFSSD Function*	Comments
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
SE	Ex-Core Neutron Monitoring	R, P	Source range monitor SENY0061A/B may be affected. Source range monitors SENE0031, SENE0032 and SENY0060A/B are unaffected.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-19.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-19. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator Atmospheric Relief Valves

It may be necessary to fail close steam generator ARV ABPV0001 by closing valves KAV1435 (air) and KAV1364 (nitrogen) and bleeding air from the regulator.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Auxiliary Feedwater

It may be necessary to line up AFW using the TDAFP, supplied by Train B ESW or using the Train B MDAFP supplied by either the CST or ESW. Since ARV ABPV0001 may be affected, it may be necessary to use the TDAFP in order to cooldown using at least two steam generators.

3.2.2 Mitigation of RWST Draindown to Containment Sump

If a fire occurs in area A-19, it may be necessary to close valves BNHV8812A and BNHV8812B from the control room using BNHIS8812A and BNHIS8812B, respectively, to mitigate draindown of the RWST into the containment sump. This condition could occur due to EJHV8811A and/or EJHV8811B spuriously opening but stalling before reaching full open position, thereby not providing the permissive for BNHV8812A and BNHV8812B to close. RWST level indication is available using level indicator BNLI0933.

3.2.3 Component Cooling Water

Train A CCW could be affected by a fire in this area. If this occurs, swap to Train B CCW using normal operating procedures.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 Residual Heat Removal System

It may be necessary to repair damage to the NG02B incoming power cables 14NGG01AD and 14NGG01AE to restore power to BBPV8702A and BBPV8702B prior to starting RHR, or a containment entry should be made to open the desired valve.

3.3.2 SI Accumulator Isolation

It may be necessary to repair damage to the NG02B incoming power cables 14NGG01AD and 14NGG01AE to restore power to valves EPHV8808B and EPHV8808D to allow them to be isolated prior to the RCS reaching ≅ 1,000 psi. Otherwise, nitrogen pressure can be relieved from tanks B and D to prevent injection. Valves EPHV8808A and EPHV8808C are unaffected.

4.0 CONCLUSION

With some exceptions, redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed cable-by-cable analysis for a fire in area A-19.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-19

There is no PFSSD equipment located in area A-19. The area only contains cables associated with PFSSD equipment located in a different fire area. For an evaluation of the PFSSD cables located in area A-19, see Section 5.2.

5.2 PFSSD CABLE EVALUATION

Table A-19-3 lists all the PFSSD cables (S. in E-15000) located in fire area A-19. The applicable evaluation section is also listed in Table A-19-3.

Table A-19-3
PFSSD Cables Located in Fire Area A-19

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ABI20EE	1506, 1513	ABPV0001	I	5.2.1	S/G A ARV I/P Converter ABPY0001
11ALG02BA	1513	ALHV0035	P	5.2.2	CST to Train A MDAFP
11ALG02BB	1513	ALHV0035	C	5.2.2	CST to Train A MDAFP
11ALG02BC	1513	ALHV0035	C	5.2.2	CST to Train A MDAFP
11ALG02CA	1513	ALHV0036	P	5.2.2	CST to TDAFP
11ALG02CB	1513	ALHV0036	C	5.2.2	CST to TDAFP
11ALG02CC	1513	ALHV0036	C	5.2.2	CST to TDAFP
11ALG04BA	1513	ALHV0031	P	5.2.2	ESW to Train A MDAFP
11ALG04BB	1513	ALHV0031	C	5.2.2	ESW to Train A MDAFP
11ALG04BC	1513	ALHV0031	C	5.2.2	ESW to Train A MDAFP
11ALG04BD	1513	ALHV0031	C	5.2.2	ESW to Train A MDAFP
11ALG04BE	1513	ALHV0031	C	5.2.2	ESW to Train A MDAFP
11ALG04CA	1513	ALHV0032	P	5.2.2	Train A ESW to TDAFP
11ALG04CB	1513	ALHV0032	C	5.2.2	Train A ESW to TDAFP
11ALG04CC	1513	ALHV0032	C	5.2.2	Train A ESW to TDAFP
11ALG04CD	1513	ALHV0032	C	5.2.2	Train A ESW to TDAFP
11ALG04CE	1513	ALHV0032	C	5.2.2	Train A ESW to TDAFP
11BBG03AA	1513	BBHV0013	P	5.2.4	RCP A Thermal Barrier Return Iso Valve
11BBG03AB	1513	BBHV0013	C	5.2.4	RCP A Thermal Barrier Return Iso Valve
11BBG03AC	1513	BBHV0013	C	5.2.4	RCP A Thermal Barrier Return Iso Valve
11BBG03AD	1513	BBHV0013	C	5.2.4	RCP A Thermal Barrier Return Iso Valve
11BBG03BA	1513	BBHV0014	P	5.2.4	RCP B Thermal Barrier Return Iso Valve
11BBG03BB	1513	BBHV0014	C	5.2.4	RCP B Thermal Barrier Return Iso Valve

Table A-19-3
PFSSD Cables Located in Fire Area A-19

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BBG03BC	1513	BBHV0014	C	5.2.4	RCP B Thermal Barrier Return Iso Valve
11BBG03BD	1513	BBHV0014	C	5.2.4	RCP B Thermal Barrier Return Iso Valve
11BBG03CA	1513	BBHV0015	P	5.2.4	RCP C Thermal Barrier Return Iso Valve
11BBG03CB	1513	BBHV0015	C	5.2.4	RCP C Thermal Barrier Return Iso Valve
11BBG03CC	1513	BBHV0015	C	5.2.4	RCP C Thermal Barrier Return Iso Valve
11BBG03CD	1513	BBHV0015	C	5.2.4	RCP C Thermal Barrier Return Iso Valve
11BBG03DA	1513	BBHV0016	P	5.2.4	RCP D Thermal Barrier Return Iso Valve
11BBG03DB	1513	BBHV0016	C	5.2.4	RCP D Thermal Barrier Return Iso Valve
11BBG03DC	1513	BBHV0016	C	5.2.4	RCP D Thermal Barrier Return Iso Valve
11BBG03DD	1513	BBHV0016	C	5.2.4	RCP D Thermal Barrier Return Iso Valve
11BNI07CA	1504, 1506, 1513	BNLT0930	I	5.2.3	RWST Level Transmitter
11EFG04AA	1513	EFHV0059	P	5.2.4	ESW return to UHS from CCW A Hx
11EFG04AB	1513	EFHV0059	C	5.2.4	ESW return to UHS from CCW A Hx
11EFG04AC	1513	EFHV0059	C	5.2.4	ESW return to UHS from CCW A Hx
11EFG05AC	1513	EFHV0051	C	5.2.4	ESW to CCW A Heat Exchanger
11EGG05AA	1513	EGHV0015	P	5.2.4	CCW Return from Nuc Aux Comp
11EGG05AB	1513	EGHV0015	C	5.2.4	CCW Return from Nuc Aux Comp
11EGG05AC	1513	EGHV0015	C	5.2.4	CCW Return from Nuc Aux Comp
11EGG05CA	1513	EGHV0053	P	5.2.4	CCW Supply to Nuc Aux Comp
11EGG05CB	1513	EGHV0053	C	5.2.4	CCW Supply to Nuc Aux Comp
11EGG05CC	1513	EGHV0053	C	5.2.4	CCW Supply to Nuc Aux Comp
11EGG05CD	1513	EGHV0053	C	5.2.4	CCW Supply to Nuc Aux Comp
11EGG07AA	1513	EGHV0101	P	5.2.5	CCW to RHR Heat Exchanger

Table A-19-3
PFSSD Cables Located in Fire Area A-19

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EGG07AB	1513	EGHV0101	C	5.2.5	CCW to RHR Heat Exchanger
11EGG07AC	1513	EGHV0101	C	5.2.5	CCW to RHR Heat Exchanger
11EGG09DA	1513	EGHV0061	P	5.2.4	CCW Return from Thermal Barrier
11EGG09DB	1513	EGHV0061	C	5.2.4	CCW Return from Thermal Barrier
11EGG09DC	1513	EGHV0061	C	5.2.4	CCW Return from Thermal Barrier
11EGG09DD	1513	EGHV0061	C	5.2.4	CCW Return from Thermal Barrier
11EGI13AA	1513	EGPT0077	I	5.2.4	CCW Pumps A and C Disch Pressure
11EJG04AA	1513	EJHV8804A	P	5.2.5	RHR Discharge to CCP
11EJG04AB	1513	EJHV8804A	C	5.2.5	RHR Discharge to CCP
11EJG04AC	1513	EJHV8804A	C	5.2.5	RHR Discharge to CCP
11EJG06AT	1506	EJHV8811A	C	5.2.3	CTMT Recirc Sump To RHR Pump A
11GKG02AA	1513	SGK04A	P	5.2.6	Train A Control Room A/C Unit
11GKG02AB	1513	SGK04A	C	5.2.6	Train A Control Room A/C Unit
11GKY02AB	1513	GKHZ0029B	C	5.2.6	SGK04A Supply Damper
11GKY02AC	1513	GKHZ0029A	C	5.2.6	SGK04A Return Damper
11GKY02AD	1513	GKHZ0029A/B	C	5.2.6	SGK04A Return/Supply Dampers
11GKY02AE	1513	GKHZ0029A/B	P	5.2.6	SGK04A Return/Supply Dampers
11GLG06AD	1513	SGL11A	C	5.2.4	Train A CCW Pump Room Cooler
11NGG01BB	1513	NG03C	P	5.2.7	Incoming Power Feed to NG03C from NG0306
11NGG01BC	1513	NG03C	P	5.2.7	Incoming Power Feed to NG03C from NG0306
11SAZ19EA	1513	GKHZ0029A/B	C	5.2.6	Status Panel Input
11SAZ19JA	1513	SGK04A	C	5.2.6	Status Panel Input
12BNI07DA	1504, 1506	BNLT0931	I	5.2.3	RWST Level Transmitter

Table A-19-3
PFSSD Cables Located in Fire Area A-19

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
13BNI07EC	1504, 1506	BNLT0932	I	5.2.3	RWST Level Transmitter
14ABK08DA	1513	ABUY0034B	C	5.2.8	Cooldown Condenser Dump Valve Solenoid
14ABK08EA	1513	ABUY0045B	C	5.2.8	Cooldown Condenser Dump Valve Solenoid
14ABK08FA	1513	ABUY0041B	C	5.2.8	Cooldown Condenser Dump Valve Solenoid
14ABK11AA	1513	ABUY0037B	C	5.2.8	Cooldown Condenser Dump Valve Solenoid
14ABK11BA	1513	ABUY0038B	C	5.2.8	Cooldown Condenser Dump Valve Solenoid
14ABK11CA	1513	ABUY0039B	C	5.2.8	Cooldown Condenser Dump Valve Solenoid
14ABK11DA	1513	ABUY0040B	C	5.2.8	Cooldown Condenser Dump Valve Solenoid
14ABK11EA	1513	ABUY0036B	C	5.2.8	Cooldown Condenser Dump Valve Solenoid
14ABK11FA	1513	ABUY0042B	C	5.2.8	Cooldown Condenser Dump Valve Solenoid
14ABK11GA	1513	ABUY0043B	C	5.2.8	Cooldown Condenser Dump Valve Solenoid
14ABK11HA	1513	ABUY0044B	C	5.2.8	Cooldown Condenser Dump Valve Solenoid
14ABK11JA	1513	ABUY0035B	C	5.2.8	Cooldown Condenser Dump Valve Solenoid
14EFG04BA	1504	EFHV0060	P	5.2.4	ESW return to UHS from CCW B Hx
14EFG04BB	1504	EFHV0060	C	5.2.4	ESW return to UHS from CCW B Hx
14EFG05BA	1504	EFHV0052	P	5.2.4	ESW to CCW B Heat Exchanger
14EFG05BB	1504	EFHV0052	C	5.2.4	ESW to CCW B Heat Exchanger
14EGG18BA	1504	EGHV0127	P	5.2.4	EGHV0058 Bypass Valve
14EGG18BB	1504	EGHV0127	C	5.2.4	EGHV0058 Bypass Valve
14EGG18DA	1504	EGHV0133	P	5.2.4	EGHV0061 Bypass Valve
14EGG18DB	1504	EGHV0133	C	5.2.4	EGHV0061 Bypass Valve
14EJG06BT	1504	EJHV8811B	C	5.2.3	CTMT Recirc Sump To RHR Pump B
14GNI05DA	1504	GNPT0934	I	5.2.8	Containment Pressure Transmitter

Table A-19-3
PFSSD Cables Located in Fire Area A-19

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NGG01AD	1504	NG02B	P	5.2.7	Incoming Power Feed to NG02B from NG0207
14NGG01AE	1504	NG02B	P	5.2.7	Incoming Power Feed to NG02B from NG0207
14NGG01AJ	1504	NG02T	P	5.2.7	Incoming Power Feed to NG02T from NG0208
14NGG01BF	1504	NG04T	P	5.2.7	Incoming Power Feed to NG04T from NG0405
14SES07AC	1504	SENY0061A/B	I	5.2.9	Source Range Monitor

5.2.1 Steam Generator Atmospheric Relief Valves

PFSSD requires at least two steam generator atmospheric relief valves (ARV) be controlled and the other two closed. The ARVs are normally closed and require air pressure to open. Each valve is controlled by a pressure transmitter input signal from a pressure transmitter installed on the outlet side of the steam generator. The relief valve opens when pressure reaches a designated setpoint.

One cable associated with Steam Generator ARV ABPV0001 runs in area A-19. Cables associated with Steam Generator ARVs ABPV0002, ABPV0003 and ABPV0004 are not run in area A-19.

Cable 11ABI20EE runs through area A-19 from ABPY0001 in room 1508 to panel RP053AC in room 3605. Damage to this cable could cause the spurious opening of valve ABPV0001. If this occurs, an operator would have to close the ARV by isolating air and nitrogen to the valve and bleeding air from the regulator to fail the valve closed. This is done by closing valves KAV1435 (air) and KAV1364 (nitrogen) which can be accessed without having to enter fire area A-19.

Based on the above discussion, manual actions are available to ensure a fire in area A-19 will not prevent the control of two Steam Generator Atmospheric Relief Valves and the closure of the remaining two.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB20A, M-12KA04, M-12KA05

5.2.2 Auxiliary Feedwater

Power and control cables associated with certain auxiliary feedwater control valves are run in area A-19. Damage to these cables could prevent operation, or cause maloperation, of the associated motor operated valve.

Train A motor driven auxiliary feedwater pump (MDAFP) suction isolation valves from both the condensate storage tank (CST) (ALHV0035) and the essential service water system (ESW) (ALHV0031) could spuriously operate or fail to operate. This would prevent a suction source to the Train A MDAFP and would prevent operation of the pump.

The Train A ESW suction source to the turbine driven auxiliary feedwater pump (TDAFP) could be prevented due to damage to cables associated with valve ALHV0032. The CST suction source to the TDAFP could be prevented due to damage to cables associated with ALHV0036. The Train B ESW suction supply to the TDAFP is unaffected, since cables associated with ALHV0033 are run in a different fire area.

The Train B MDAFP suction sources from ESW and CST are unaffected by the fire, since cables associated with ALHV0030 (ESW) and ALHV0034 (CST) are run in a different fire area.

Based on the above discussion, both the Train B MDAFP and the TDAFP are available to provide auxiliary feedwater to the steam generators.

References: E-15000, XX-E-013, E-13AL02A, E-13AL04A, M-12AL01

5.2.3 Refueling Water Storage Tank

Cables associated with refueling water storage tank (RWST) level transmitters BNLT0930, BNLT0931 and BNLT0932 are run in area A-19. Damage to these cables could prevent proper operation of the level indicators in the control room. Cables associated with RWST level transmitter BNLT0933 are unaffected by the fire, since they are run in a different fire area. Consequently, RWST level indication is available if a fire occurs in area A-19.

A low-low RWST level signal on two out of four level transmitters will provide a permissive for containment sump isolation valves EJHV8811A and EJHV8811B to open. If this occurs coincident with a safety injection signal (SIS), the containment sump isolation valves will open, causing the RWST to drain to the sump. As stated in Section 5.2.9, a spurious SIS is not credible for a fire in area A-19. Therefore, the open permissive signal will not occur for valves EJHV8811A and EJHV8811B.

Cable 11EJG06AT, associated with containment sump isolation valve EJHV8811A, is run in this area. Damage to this cable could cause the valve to open, momentarily causing the RWST to drain to the containment sump due to normally open valve BNHV8812A. Cables associated with BNHV8812A are unaffected by a fire in this area.

If valve EJHV8811A fully opens, valve BNHV8812A will automatically close, preventing draindown of the RWST to the containment sump. If valve EJHV8811A spuriously opens but stalls before reaching full open position, valve BNHV8812A will not automatically close. If this occurs, operators will recognize a decreasing RWST level using RWST level indicator BNLI0933 and take action to close BNHV8812A using BNHIS8812A in the main control room.

Cable 14EJG06BT, associated with containment sump isolation valve EJHV8811B, is run in this area. Damage to this cable could cause the valve to open, momentarily causing the RWST to drain to the containment sump due to normally open valve BNHV8812B. Cables associated with BNHV8812B are unaffected by a fire in this area.

If valve EJHV8811B fully opens, valve BNHV8812B will automatically close, preventing draindown of the RWST to the containment sump. If valve EJHV8811B spuriously opens but stalls before reaching full open position, valve BNHV8812B will not automatically close. If this occurs, operators will recognize a decreasing RWST level using RWST level indicator BNLI0933 and take action to close BNHV8812B using BNHIS8812B in the main control room.

Based on the above discussion, damage to cables associated with valves EJHV8811A and EJHV8811B and RWST level transmitters BNLT0930, BNLT0931 and BNLT0932 will not adversely impact safe shutdown.

References: E-15000, XX-E-013, E-13BN07, E-13EJ06A, E-13EJ06B, M-12BN01, M-12EJ01

5.2.4 Component Cooling Water

Component Cooling Water (CCW) is required for PFSSD to provide cooling flow to the CCP oil coolers, the seal water heat exchanger, the RHR pump seal coolers and the RHR heat exchangers. The CCW system is also redundant to the RCP seal injection system to provide RCP seal cooling through the thermal barrier.

Cables associated with both Train A and Train B ESW to CCW heat exchanger valves are run in area A-19. However, as discussed below, Train B CCW remains available.

Cables 14EFG04BA and 14EFG04BB, associated with valve EFHV0060, are run in area A-19. Valve EFHV0060 is normally closed and is required to remain closed when operating the Train B CCW system for PFSSD. If this valve were to spuriously open, then a flow imbalance will occur in the Train B ESW system that could prevent the proper ESW flow to essential PFSSD components. Damage to these cables (hot short, open circuit or short to ground) will not cause the valve to spuriously open. The only failure in the control circuit for this valve that could cause the valve to open would be a short within cable 14EFG04BC, which is not run in area A-19. Therefore, there are no credible circuit failures that would cause valve EFHV0060 to spuriously open.

Cables 14EFG05BA and 14EFG05BB, associated with valve EFHV0052, are run in area A-19. Valve EFHV0052 is normally open and is required to remain open when operating the Train B CCW system for PFSSD. If this valve were to spuriously close, then the Train B CCW heat exchanger would have no cooling flow from the ESW system. Damage to these cables (hot short, open circuit or short to ground) will not cause the valve to spuriously close. The only failure in the control circuit for this valve that could cause the valve to close would be a short within cable 14EFG05BC, which is not run in area A-19. Therefore, there are no credible circuit failures that would cause valve EFHV0052 to spuriously close.

Train A ESW to/from CCW heat exchanger valves EFHV0051 and EFHV0059 could spuriously operate. Therefore, the Train A CCW system cannot be relied on for PFSSD if a fire occurs in area A-19.

Power and control cables associated with a number of Train A CCW valves are run in area A-19. The cables and associated components are listed in Table A-19-3. Damage to these cables will prevent operation of the Train A CCW system.

Power and control cables associated with CCW to thermal barrier cooling coil supply and return valves are run in area A-19. Valves BBHV0013, BBHV0014, BBHV0015, BBHV0016, EGHV0061, EGHV0127 and EGHV0133 could be affected by a fire in this area. A fire in this area does not affect RCP seal injection, so thermal barrier cooling is not required. Isolation of the CCW return line from the thermal barrier is not required as long as seal injection is maintained. Seal injection is unaffected by a fire in this area. Flow indicators EGFI0128 and EGFI0129 are unaffected and can be used to diagnose a loss of thermal barrier cooling.

A control cable associated with Train A CCW pump room cooler motor DSGL11A is run in area A-19. Damage to this cable could prevent operation of the room cooler. Cables associated with Train B CCW room cooler SGL11B are not run in area A-19. Therefore, the Train B CCW room cooler is available.

Based on the above discussion, Train B CCW is available in the event of a fire in area A-19. However, RCP thermal barrier cooling could be affected. This is acceptable since RCP seal injection is available.

References: E-15000, XX-E-013, E-13BB03, E-13EF04, E-13EF04A, E-13EF05, E-13EG05A, E-13EG05B, E-13EG07, E-13EG09A, E-13EG13, E-13EG18A, M-12EF02, M-12EG01, E-13GL06, B-12BB03, M-12EG02, M-12EG03

5.2.5 Residual Heat Removal System

PFSSD requires one train of residual heat removal (RHR) to be available for shutdown cooling. The RHR system is not used for hot standby.

Power and control cables associated with valve EJHV8804A are run in area A-19. This valve is required to remain closed for PFSSD when operating the Train A RHR system. Maintaining the valve closed will prevent flow diversion from the RCS to the CVCS.

Valve EGHV0101 is the Train A CCW to RHR Heat Exchanger control valve. Valve EGHV0102 is the Train B CCW to RHR Heat Exchanger control valve. The valves are normally closed during power operation. PFSSD requires that the valve on the operating train of CCW be closed until shutdown cooling mode is entered, at which time the valve on the operating train of RHR needs to be open. As stated in Section 5.2.4, the Train A CCW system may not be available to supply cooling water to the Train A RHR heat exchanger.

The Train B CCW system is available to supply cooling water to the Train B RHR heat exchanger. Cables associated with valves EGHV0102 and EJHV8804B are not run in area A-19. Therefore, the Train B RHR system is available to provide decay heat removal if a fire occurs in area A-19.

References: E-15000, XX-E-013, E-13EG07, E-13EJ04A, M-12EJ01

5.2.6 Control Room A/C Units

Power and control cables associated with Train A control room A/C unit SGK04A are run in area A-19. In addition, power and control cables associated with SGK04A supply and return dampers GKHZ0029B and GKHZ0029A, respectively, are run in area A-19. Damage to these cables could prevent operation of SGK04A.

Cables associated with Train B control room A/C unit SGK04B and associated dampers are run in a different fire area and are unaffected by a fire in area A-19. Therefore, control room A/C is available if a fire occurs in area A-19.

References: E-15000, XX-E-013, E-13GK02A, E-13GK02B, E-13GK02C, E-13SA19, M-12GK01

5.2.7 480 VAC Power Distribution

Main power feeder cables to both Train A and Train B 480 VAC motor control centers located in the Auxiliary Building run in area A-19. Damage to these cables could prevent operation of a number of components on both trains. Loss of power to Train A components served by these cables is acceptable since a number of other Train A components are affected by a fire in this area. Loss of power to Train B components served by these cables may impact the ability to achieve and maintain safe shutdown following a fire in this area. The following paragraphs discuss the consequences of a loss of 480 VAC power to affected Train B components.

Motor control center NG02B could lose power due to damage to cables 14NGG01AD and 14NGG01AE. The following table lists each PFSSD component that is supplied 480 VAC power from NG02B and the consequences of a loss of power to the component.

480 VAC Motor Control Center NG02B		
MCC Breaker	**Description**	**Consequences**
NG02BAF2	South Electrical Penetration Room Cooler DSGL15B	Since NG02B is located in the South Electrical Penetration Room (A-17), loss of power to NG02B will significantly reduce the heat load within the room. As stated in the remainder of this table, loss of power to NG02B will not adversely impact the ability to achieve and maintain PFSSD. Excessive temperature in the room will not cause the valves to move to an undesired position. Therefore, loss of power to the Train B electrical penetration room cooler will not affect the ability to achieve and maintain PFSSD. Therefore, no adverse impact.
NG02BBF1	Power Feed to XPN08A	PG20GER5 remains available to supply power to PN08. Therefore, no adverse impact.
NG02BBF3	Valve BBPV8702B	Valve is normally de-energized and closed. When transitioning to RHR for cold shutdown, a repair would be necessary to restore power and open the valve or a containment entry made to open the valve. Therefore, no adverse impact.
NG02BBR2	Valve EJHV8809B	Valve is normally open and is required to be open when operating RHR Train B. Loss of power will fail the valve in the open position. Therefore, no adverse impact.
NG02BBR3	Valve EJHV8840	Valve is normally closed and is required to remain closed when operating RHR. Loss of power will fail the valve in the closed position. Therefore, no adverse impact.
NG02BCF2	Valve BBPV8702A	Valve is normally de-energized and closed. When transitioning to RHR for cold shutdown, a repair would be necessary to restore power and open the valve or a containment entry made to open the valve. Therefore, no adverse impact.
NG02BDF1	Valve BBHV8000B	Valve is normally open and is required to be closed or pressurizer PORV BBPCV0456A is required to remain closed. Loss of power will prevent closing BBHV8000B but the PORV is unaffected by the fire and will remain closed. Therefore, no adverse impact.
NG02BDF3	Valve EGHV0062	Valve is normally open and would remain open if power is lost. If a loss of all seal cooling occurs due to the fire, then valve EGHV0061 or this valve is required to be closed to protect the CCW piping. Seal injection is unaffected by the fire, so the position of this valve is of no consequence. Therefore, no adverse impact.
NG02BDR1	Valve EFHV0032	Valve is required to be open when operating the Train B containment air coolers. The valve is normally open and will remain open if power is lost. Therefore, no adverse impact.
NG02BDR2	Valve EFHV0050	Valve is required to be open when operating the Train B containment air coolers. The valve is normally open and will remain open if power is lost. Therefore, no adverse impact.
NG02BEF1	Valve EGHV0127	Valve is normally closed and can remain closed for PFSSD. Loss of power will maintain valve in a closed position. Therefore, no adverse impact.
NG02BEF2	Valve EJHV8811B	Valve is normally closed and is required to remain closed for PFSSD. Loss of power will maintain valve in closed position. Therefore, no adverse impact.
NG02BFR1	Relay Panel (EJHV8811B)	This is a relay panel section that houses relay 3XEJ19 associated with EJHV8811B. Loss of power to this relay will maintain the valve in its normally closed position, which is the desired PFSSD position. Therefore, no adverse impact.

480 VAC Motor Control Center NG02B		
MCC Breaker	**Description**	**Consequences**
NG02BGF3 NG02BHF2	Valve EPHV8808B Valve EPHV8808D	Accumulator tank valves EPHV8808B and EPHV8808D are required to be closed prior to the RCS reaching @ 1,000 psi to prevent accidental accumulator injection. Loss of power to the valves will prevent them from being closed when necessary. The valves are closed when going to cold shutdown, so a cold shutdown repair is allowed. The power cable can either be repaired or nitrogen pressure can be relieved from the tanks to prevent injection. Therefore, no adverse impact.
NG02BHF1	Valve EGHV0133	Valve is normally closed and can remain closed for PFSSD. Loss of power will maintain valve in a closed position. Therefore, no adverse impact.
NG02BHF3	Valve EFHV0034	Valve is required to be open when operating the Train B containment air coolers. The valve is normally open and will remain open if power is lost. Therefore, no adverse impact.
NG02BHR2	Valve EFHV0046	Valve is required to be open when operating the Train B containment air coolers. The valve is normally open and will remain open if power is lost. Therefore, no adverse impact.

MCCs NG02T and NG04T could lose power due to damage to cables 14NGG01AJ and 14NGG01BF, respectively. These MCCs supply power to containment coolers SGN01B and SGN01D. Loss of power to these MCCs will cause a loss of power to the Train B containment coolers. Train A containment coolers are unaffected by a fire in area A-19.

References: E-15000, XX-E-013, E-11NG20, E-13NG01A, E-1F9424A, M-12GN01

5.2.8 Main Steam Isolation Valve (MSIV) Downstream Components

Control cables for several components downstream of the MSIVs are run in area A-19. These components are required to function (close) in the event the MSIVs cannot be closed due to the fire. A fire in area A-19 will not prevent the closure of the MSIVs or the MSIV bypass valves. Therefore, cable damage to the components downstream of the MSIVs will not adversely impact the ability to achieve and maintain PFSSD.

References: E-15000, XX-E-013, E-13AB08, E-13AB11A, E-13AB11B, E-13AB11C, E-1F9101, E-1F9103

5.2.9 Safety Injection and Containment Spray

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. During operation and hot standby, where the RCS is greater than 1,000 psi, the SI pumps will operate on minimum flow and re-circulate water back to the RWST. Therefore, a spurious start of the SI pumps will not impact PFSSD, but should be stopped for cold shutdown.

A spurious containment spray actuation signal (CSAS) could cause the containment spray pumps to operate, depleting inventory in the RWST. Mitigation of a spurious CSAS should occur prior to the RWST volume going below the minimum necessary to achieve cold shutdown conditions.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.

3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and, ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Containment spray (CS) is initiated automatically by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937.

Cables associated with GNPT0935, GNPT0936 and GNPT0937 are not run in area A-19. Only one cable associated with GNPT0934 is run in area A-19. Therefore, a fire in area A-19 will not cause a spurious SIS or CSAS due to high containment pressure.

References: E-15000, XX-E-013, E-13GN05, E-1F9431, M-12GN01

5.2.10 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B.

One cable associated with SENY0061A/B runs in area A-19. Cables for the remaining source range monitors are run outside area A-19 and would be unaffected by a fire. Therefore, source range monitoring remains available if a fire occurs in area A-19.

For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013, Attachment 3.

References: E-15000, XX-E-013, E-13SE07, E-1F9101

FIRE AREA A-20

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-20 is located on the 2047 elevation of the Auxiliary Building and includes the rooms listed in Table A-20-1.

Table A-20-1
Rooms Located in Fire Area A-20

ROOM #	DESCRIPTION
1502	Train B CCW Surge Tank Area
1503	Train A CCW Surge Tank Area
1505	Corridor
1507	Personnel Access Hatch Area

Fire area A-20 has partial automatic fire detection installed. There is no automatic suppression in this area.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-20-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-20-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-20

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
BN	Borated Refueling Water Storage System	R, M, H	Level transmitters BNLT0930, BNLT0931 and BNLT0932 may be affected. Level transmitter BNLT0933 is available.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.

Table A-20-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-20

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
GN	Containment Coolers	S	Containment pressure transmitter GNPT0934 may be affected. The remaining containment pressure transmitters are unaffected.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.

Table A-20-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-20

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.

Table A-20-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-20

System	System Name	PFSSD Function*	Comments
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
SE	Ex-Core Neutron Monitoring	R, P	Source range monitor SENY0061A/B may be affected. Source range monitors SENE0031, SENE0032 and SENY0060A/B are unaffected.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-20.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-20. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-20.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-20

PFSSD components (S. in E-15000) located in fire area A-20 are shown in Table A-20-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-20-3.

Table A-20-3
PFSSD Equipment Located in Fire Area A-20

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1502	EGLG0008	Train B CCW Surge Tank Level Glass	5.1.1	Mechanical device – no cables
1502	TEG01B	Train B CCW Surge Tank	5.1.1	Mechanical device – no cables
1503	EGLG0007	Train A CCW Surge Tank Level Glass	5.1.1	Mechanical device – no cables
1503	TEG01A	Train A CCW Surge Tank	5.1.1	Mechanical device – no cables

5.1.1 Component Cooling Water Surge Tanks

Both trains of CCW surge tanks are located in area A-20, separated by a partial dividing wall. The tanks are used for volume expansion in the closed loop CCW system and provide a constant suction head for the CCW pumps. The tanks are mechanical devices that require no electrical input to operate. Therefore, they are not subject to failure in the event of a fire. The Fire Hazards Analysis (E-1F9905) provides a discussion of the fire protection features and combustible loading in area A-20.

The sight glasses are also mechanical and do not transmit tank level to the control room. The sight glasses are used by operations in their normal rounds to record the level in the tanks. The sight glasses are not subject to damage by fire.

A fire in area A-20 will not affect operation of either CCW surge tank.

References: E-15000, XX-E-013, E-1F9401A, E-1F9905, M-12EG01

5.2 PFSSD CABLE EVALUATION

Table A-20-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-20. The applicable evaluation section is also listed in Table A-20-4.

Table A-20-4
PFSSD Cables Located in Fire Area A-20

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BNI07CA	1507	BNLT0930	I	5.2.1	RWST Level Transmitter
12BNI07DA	1507	BNLT0931	I	5.2.1	RWST Level Transmitter
13BNI07EC	1507	BNLT0932	I	5.2.1	RWST Level Transmitter
14GNI05DA	1507	GNPT0934	I	5.2.2	Containment Pressure Transmitter
14SES07AC	1507	SENY0061A/B	I	5.2.3	Source Range Monitor

5.2.1 Refueling Water Storage Tank

The RWST is credited in the PFSSD analysis as the primary source of borated water to achieve cold shutdown. The Wolf Creek Technical Specifications ensure the minimum quantity and boron concentration is maintained to achieve cold shutdown. Therefore, RWST level transmitters, indicators and circuits are not evaluated for level control.

The RWST level transmitters and associated circuits are included in the PFSSD analysis because of the automatic functions they perform. In particular, a low level in the RWST on 2 out of 4 RWST level transmitters, coincident with a safety injection signal (SIS), will initiate a swapover, which is not desired for PFSSD because it could cause the RWST to drain to the containment sump.

Cables associated with refueling water storage tank (RWST) level transmitters BNLT0930, BNLT0931 and BNLT0932 are run in area A-20. Damage to these cables could initiate a spurious low-low RWST level signal. A spurious SIS is not credible if a fire occurs in area A-20 per Section 5.2.2. Therefore, the open permissive will not occur for valves EJHV8811A and EJHV8811B. Consequently, a spurious RWST draindown is not credible if a fire occurs in this area.

Based on the above discussion, the RWST is available if a fire occurs in area A-20.

References: E-15000, XX-E-013, E-13BN07, E-13EJ06A, E-13EJ06B, M-12BN01, M-12EJ01

5.2.2 Safety Injection and Containment Spray

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. During operation and hot standby, where the RCS is greater than 1,000 psi, the SI pumps will operate on minimum flow and re-circulate water back to the RWST. Therefore, a spurious start of the SI pumps will not impact PFSSD, but should be stopped for cold shutdown.

A spurious containment spray actuation signal (CSAS) could cause the containment spray pumps to operate, depleting inventory in the RWST. Mitigation of a spurious CSAS should occur prior to the RWST volume going below the minimum necessary to achieve cold shutdown conditions.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and, ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Containment spray (CS) is initiated automatically by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937.

Cables associated with GNPT0935, GNPT0936 and GNPT0937 are not run in area A-20. Only one cable associated with GNPT0934 is run in area A-20. Therefore, a fire in area A-20 will not cause a spurious SIS or CSAS due to high containment pressure.

References: E-15000, XX-E-013, E-13GN05, E-1F9431, M-12GN01

5.2.3 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B.

One cable associated with SENY0061A/B runs in area A-20. Cables for the remaining source range monitors are run outside area A-20 and would be unaffected by a fire. Therefore, source range monitoring remains available if a fire occurs in area A-20.

For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013, Attachment 3.

References: E-15000, XX-E-013, E-13SE07, E-1F9101

FIRE AREA A-21

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-21 is located on the 2047'-6" elevation of the Auxiliary Building and includes the room listed in Table A-21-1.

Table A-21-1
Room Located in Fire Area A-21

ROOM #	DESCRIPTION
1501	Train B Control Room A/C Unit

Fire area A-21 has no installed automatic suppression system but is provided with automatic fire detection throughout.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-21-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-21-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-21

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	All PFSSD functions associated with the main steam system are satisfied. Steam generators B and C are controlled and steam generators A and D are isolated. Hand switch ABHS0080 is available to close the MSIVs and bypass valves. ABPV0004 (S/G D) may need to be manually closed by isolating and venting air and nitrogen lines. Steam generator B and C level indication is available.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
AE	Main Feedwater	H, P	All PFSSD functions associated with the main feedwater system are satisfied. Isolate all four main feedwater isolation valves using hand switch AEHS0080.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. Train A MDAFP is available to supply S/Gs B and C. ALFT0009 and ALFT0011 are available to provide auxiliary feedwater flow indication from MDAFP A to SGs B and C, respectively. Condensate Storage Tank (CST) pressure indication is available using pressure transmitters ALPT0037 and ALPT0038 and MDAFP A suction pressure transmitter ALPT0025.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
BB	Reactor Coolant System	R, M, H, P, S	All PFSSD functions associated with the reactor coolant system are satisfied. All four RCP seal injection valves will remain open. Loss of inventory through the head vent valves is prevented by maintaining valves BBHV8001A or BBHV8002A and BBHV8002B closed. When transferring to RHR, valve BBPV8702A may need to be manually opened to provide a suction source from the RCS to RHR pump A.
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. Train A Centrifugal Charging Pump (CCP) is available to provide charging flow from the RWST through the RCP seals and BIT. Vave BGHV8106 is available to isolate normal charging. VCT discharge valve BGLCV0112B is available to isolate the VCT from the charging pump suction header. Excess letdown is isolated using BGHV8154B and either BGHV8153A or BGHV8154A.

Table A-21-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-21

System	System Name	PFSSD Function*	Comments
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blowdown system are satisfied. Steam generator blowdown is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C, located on the BM157 panel in the radwaste control room.
BN	Borated Refueling Water Storage System	R, M, H	The RWST is available to provide a suction source to Centrifugal Charging Pump A via valve BNLCV0112D. RWST level indicators BNLI0930, BNLI0932 and BNLI0933 are available. When initiating RHR, flow from the RWST to RHR pump A can be isolated using BNHV8812A.
EF	Essential Service Water System	H, S	All PFSSD functions associated with the Essential Service Water (ESW) system are satisfied. Train A ESW is available to supply cooling water to Auxiliary Feedwater Pump room cooler SGF02A, Containment Air Coolers SGN01A and SGN01C, Train A Component Cooling Water (CCW) Heat Exchanger, CCW A pump room cooler SGL11A, CCP A room cooler SGL12A and RHR A room cooler SGL10A.
EG	Component Cooling Water System	S	All PFSSD functions associated with the Component Cooling Water (CCW) system are satisfied. Train A CCW is available to provide cooling water to the RHR A heat exchanger, the CCP A oil cooler, the seal water heat exchanger and the RHR pump A seal cooler. Either CCW pumps PEG01A or PEG01C are available. Temperature control valve EGTV0029 is unaffected by the fire. CCW flow to the RCP thermal barrier could be temporarily disrupted due to closure of valves EGHV0062 and EGHV0071. Bypass valves EGHV0126 and EGHV0132 can be opened from the control room to restore CCW flow to the thermal barriers. RCP seal injection is unaffected. CCW to RCP flow indicator EGFI0129 could be affected. CCW to RCP flow indicator EGFI0128 is unaffected. Valve EGHV0102 could spuriously open or may not open when operating Train B RHR. Valve EGHV0101 is unaffected.
EJ	Residual Heat Removal System	M, H, P	All PFSSD functions associated with the Residual Heat Removal (RHR) system are satisfied. Loss of RCS inventory through the RHR flow path is prevented by maintaining valves EJHV8701A and EJHV8701B closed. RHR Train A is available via RCS suction valve EJHV8701A and discharge valves EJHCV0606 and EJHV8809A. RHR pump A mini-flow valve EJFCV0610 is available. Containment sump isolation valve EJHV8811B could spuriously open, causing a draindown path from the RWST to the containment sump. Valve BNHV8812B will automatically close, as designed, when EJHV8811B reaches full open position, mitigating draindown. However, if EJHV8811B stalls before reaching full open position, BNHV8812B will not automatically close. In this case, operators can close BNHV8812B using BNHIS8812B in the main control room.

Table A-21-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-21

System	System Name	PFSSD Function*	Comments
EM	High Pressure Coolant Injection	R, M	All PFSSD functions associated with the High Pressure Coolant Injection system are satisfied. Valves EMHV8801A and EMHV8803A are available to ensure a charging flow path from the Train A CCP to the BIT.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
EP	Safety Injection Accumulators	H	The PFSSD Decay Heat Removal function associated with the Safety Injection Accumulators is satisfied. Accumulator injection lines can be isolated by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. It may be necessary to make a containment entry to manually close EPHV8808B and EPHV8808D.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
FC	Auxiliary Turbines	R, H, P	The TDAFP steam trap valve FCFV0310 may be affected. Steam loss through this valve will not affect PFSSD.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
GF	AFW Pump Room Coolers	S	The PFSSD Support function associated with the AFW Pump Room Coolers is satisfied. Train B MDAFP room cooler SGF02B may be affected. Train A MDAFP room cooler SGF02A is available.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD Support function associated with the Control Room and Class 1E Switchgear Room Coolers is satisfied. Control room A/C unit SGK04A is not affected by a fire in area A-21. Train A Class 1E Switchgear Room Cooler SGK05A is unaffected by a fire in area A-21.
GL	Auxiliary Building HVAC	S	The PFSSD Support function associated with the Auxiliary Building HVAC system is satisfied. Train A CCW pump room cooler SGL11A is available.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
GN	Containment Coolers	S	The PFSSD Support function associated with the Containment Coolers is satisfied. Train A (SGN01A and SGN01C) Containment Coolers are available. ESW Train A is available to supply cooling water to the containment coolers.
JE	Diesel Fuel Oil	S	Diesel fuel oil transfer pump PJE01B could be affected.

Table A-21-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-21

System	System Name	PFSSD Function*	Comments
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
KJ	Standby Diesel Engine	S	Diesel fuel oil transfer pump PJE01B could be affected, preventing operation of the Train B EDG.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
NE	Standby Diesel Generator	S	Diesel fuel oil transfer pump PJE01B could be affected, preventing operation of the Train B EDG.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
NG	480V Load Centers and MCCs	S	Train A Load Centers NG01, NG03 and MCC NG05E are available to supply 480 VAC PFSSD loads.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.

Table A-21-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-21

System	System Name	PFSSD Function*	Comments
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
RP	Miscellaneous Control Panels	R, M, H, P, S	Train B control room lockout relays are affected. Train A components are available and can be controlled from the control room.
SA	ESFAS	S	Status panel SA066B monitoring of SGK04B and associated components may be affected. Status panel SA066A is unaffected.
SB	Reactor Protection System	R, S	Indication at RP118B for several RPS devices may be lost. This will not affect indication in the main control room.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
SE	Ex-Core Neutron Monitoring	R, P	Source Range monitors SENE0031, SENE0032 and SENY0060A/B are available.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-21.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-21. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Isolation of SGK04B

A fire could cause spurious operation of SGK04B. If this occurs, operators can isolate power to the unit by opening breaker NG0205 located in fire area C-10 (Room 3302).

3.1.2 Steam Generator Atmospheric Relief Valve ABPV0004

Steam Generator ARV ABPV0004 could spuriously open. If necessary, operators can fail the ARV closed by closing the air and nitrogen supply valves KAV1429 and KAV1365, respectively. These valves are located in fire area A-23 and access is available without having to traverse area A-21.

3.1.3 Steam Generator Blowdown to Blowdown Flash Tank Isolation

If a fire occurs in area A-21, cables for BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A may be damaged by the fire. Therefore, use BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C located on the BM157 panel in the Radwaste Control room to close valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Thermal Barrier Cooling

CCW flow to the thermal barrier cooling coils could be lost due to the spurious closure of valves EGHV0062 and EGHV0071. If this occurs, operators could open bypass valves EGHV0126 and EGHV0132 to restore thermal barrier cooling. Otherwise, operators should close EGHV0061 using EGHIS0061 to prevent a steam bubble from damaging the CCW piping. CCW to RCP flow indicator EGFI0128 is available to diagnose a loss of CCW flow to the RCP thermal barriers.

3.2.2 Main Steam Isolation Valves (MSIVs) and MSIV Bypass Valves

Cables for hand switch ABHS0079 may be damaged by the fire. Cables for redundant hand switch ABHS0080 are unaffected. Use ABHS0080 to close the MSIVs and MSIV bypass valves.

3.2.3 Main Feedwater Isolation Valves (MFIVs)

Cables for hand switch AEHS0081 may be damaged. Cables for redundant hand switch AEHS0080 are unaffected. Use AEHS0080 to close the MFIVs.

3.2.4 Mitigation of RWST Draindown to Containment Sump

If a fire occurs in area A-21, it may be necessary to close valve BNHV8812B from the control room using BNHIS8812B to mitigate draindown of the RWST into the containment sump. This condition could occur due to EJHV8811B spuriously opening but stalling before reaching full open position, thereby not providing the permissive for BNHV8812B to close. RWST level indication is available using level indicators BNLI0930, BNLI0932 and BNLI0933.

3.2.5 Component Cooling Water

Train B CCW could be affected by a fire in this area. If this occurs, swap to Train A CCW using normal operating procedures if Train A CCW is not already running.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR

It may be necessary to repair damage to the NG02B incoming power cables 14NGG01AD and 14NGG01AE to restore power to NG02B to allow opening of either valve BBPV8702A or BBPV8702B. Otherwise, a containment entry could be made to open the appropriate valve.

3.3.2 Accumulator Tank Isolation

It may be necessary to repair damage to the NG02B incoming power cables 14NGG01AD and 14NGG01AE to restore power to valves EPHV8808B and EPHV8808D to allow them to be isolated prior to the RCS reaching @ 1,000 psi. Otherwise, nitrogen pressure can be relieved from tanks B and D to prevent injection. Valves EPHV8808A and EPHV8808C are unaffected.

4.0 CONCLUSION

With some exceptions, redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-21.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-21

PFSSD components (S. in E-15000) located in fire area A-21 are shown in Table A-21-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-21-3.

Table A-21-3
PFSSD Equipment Located in Fire Area A-21

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1501	EFHS0052	EFHV0052 Control Room Isolation Switch	5.2.16	
1501	EFHS0060	EFHV0060 Control Room Isolation Switch	5.2.16	
1501	EGHS0016A	EGHV0016 Control Room Isolation Switch	5.1.3	
1501	EGHS0054	EGHV0054 Control Room Isolation Switch	5.1.3	
1501	EMHS8803B	EMHV8803B Control Room Isolation Switch	5.1.3	
1501	GK199A	Control Room A/C Unit SGK04B Control Panel	5.1.1	
1501	GK199B	Control Room A/C Unit SGK04B Power Panel	5.1.1	
1501	GK199C	Control Room A/C Unit SGK04B Power/Control Panel	5.1.1	
1501	GKHS0103	Class 1E Elec Equip A/C Unit SGK05B Handswitch	5.1.2	
1501	GKHS0040	Control Room A/C Unit SGK04B Handswitch	5.1.1	
1501	GKHZ0040A	Control Room A/C Unit SGK04B Inlet Damper	5.1.1	
1501	GKHZ0040B	Control Room A/C Unit SGK04B Outlet Damper	5.1.1	
1501	NG04C	480V Class 1E Auxiliary Building MCC	5.1.3	
1501	NG04CCF2	MDAFP B to SG D Isolation Valve ALHV0005	5.1.3	
1501	NG04CCF3	ESW to MDAFP B Suction Isolation Valve ALHV0030	5.1.3	
1501	NG04CCF4	ESW to TDAFP Suction Isolation Valve ALHV0033	5.1.3	
1501	NG04CDF1	Train B MDAFP Room Cooler SGF02B	5.1.3	
1501	NG04CDF2	MDAFP B to SG A Isolation Valve ALHV0007	5.1.3	
1501	NG04CDF5	RCP Seal Injection Isolation Valve BBHV8351A	5.1.3	

Table A-21-3
PFSSD Equipment Located in Fire Area A-21

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1501	NG04CEF4	RCP Seal Injection Isolation Valve BBHV8351B	5.1.3	
1501	NG04CEF5	RCP Seal Injection Isolation Valve BBHV8351C	5.1.3	
1501	NG04CFF1	Charging Line Isolation Valve BGHV8105	5.1.3	
1501	NG04CFF3	RCP Seal Injection Isolation Valve BBHV8351D	5.1.3	
1501	NG04CFF4	Control Room Inlet Damper GKHZ0040A	5.1.3	
1501	NG04CHF2	ESW Return from CCW Hx Isolation Valve EFHV0060	5.1.3	
1501	NG04CHF3	CCW to RHR Hx B Isolation Valve EGHV0102	5.1.3	
1501	NG04CJF3	CCW Return from Nuc Aux Comp Iso Valve EGHV0016	5.1.3	
1501	NG04CKF1	CCW to Nuclear Auxiliary Components (EGHV0054)	5.1.3	
1501	NG04CKF2	Train B CCP to BIT Isolation Valve EMHV8803B	5.1.3	
1501	NG04CKF3	BIT Outlet Isolation Valve EMHV8801B	5.1.3	
1501	NG04CLF115	MDAFP B to SG D Isolation Valve ALHV0005	5.1.3	
1501	NG04CLF116	MDAFP B to SG A Isolation Valve ALHV0007	5.1.3	
1501	NG04CLF121	Control Room Inlet/Outlet Dampers GKHZ0040A/40B	5.1.3	
1501	NG04CLF2	CCW to RCS Isolation Valve EGHV0071	5.1.3	
1501	NG04CMF1	Incoming Line from NG04	5.1.3	
1501	NG04CMF2	Train B CCW Pump Room Cooler DSGL0011B	5.1.3	
1501	NG04CNF1	MDAFP B Suction Isolation Valve ALHV0034	5.1.3	

Table A-21-3
PFSSD Equipment Located in Fire Area A-21

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1501	NG04CNF3	ESW B to CCW B Hx Isolation Valve EFHV0052	5.1.3	
1501	NG04CPF2	Immediate Borate to Charging Pump Vlv (BGHV8104)	5.1.3	
1501	SENY61A	Source Range Monitor	5.1.4	
1501	SENY61B	Source Range Monitor	5.1.4	
1501	SGK04B	Train B Control Room A/C Unit	5.1.1	
1501	TB15102	Train B Control Room A/C Unit Terminal Box	5.1.1	
1501	TB15204	Fire Cable Termination Box	5.2.17	

5.1.1 Control Room A/C Unit SGK04B

Control room air conditioning is required to be available to satisfy the PFSSD support function. Two redundant and independent air conditioning units (SGK04A and SGK04B) are provided to satisfy this function. At least one unit is required to be available for PFSSD.

Train B control room A/C unit SGK04B and associated power and control panels (GK199A, GK199B and GK199C) are located in fire area A-21. In addition, power and control cables associated with this unit are also run in this area. A fire could damage cables and equipment associated with SGK04B, which would prevent operation of the unit or cause the unit to spuriously operate.

Hand switch GKHS0040 is located in area A-21. The hand switch is used to locally start the unit and isolate the control circuits from the control room. Damage to this switch or associated cables could prevent operation of the unit or cause the unit to spuriously operate.

Spurious operation of the unit can be mitigated by opening breaker NG0205 located in fire area C-10 (Room 3302).

Control room A/C unit SGK04B inlet and outlet dampers GKHZ0040A and GKHZ0040B and associated control cables are located in the area. Damage to the cables or equipment due to a fire could prevent operation of the dampers, which would prevent operation of SGK04B.

Redundant Train A control room A/C unit SGK04A and associated cables and equipment are located in a different fire area and are separated by minimum 3-hour rated fire barriers. Therefore, there is reasonable assurance that control room ventilation will be available using Train A control room A/C unit SGK04A. Therefore, no E-1F9900 OMA is required to address SGK04B function.

References: E-15000, XX-E-013, E-13GK02D, E-13GK02E, E-13SA20, E-1F9442, M-12GK01

5.1.2 Class 1E Elec Equip A/C Unit SGK05B

The PFSSD support function requires Class 1E electrical equipment air conditioning on the operating train of equipment. Class 1E electrical equipment air conditioning is provided by units SGK05A (Train A) and SGK05B (Train B). Both units are normally operating, providing cooling to their associated train of equipment.

Hand switch GKHS0103 is used in OFN RP-017 in response to a control room fire. Operation of the handswitch from NORMAL to ISO/RUN position isolates SGK05B control circuits from the control room and starts the unit. Damage to this switch or associated cables (14GKG13BF, 14GKG13BK, 14GKG13BL and 14GKG13BM) could prevent operation of the unit or cause the unit to spuriously start.

Cable 14GKG13BE is a control cable for SGK05B and runs to relay panel RP331 in area A-16 North. Damage to this cable could prevent automatic operation of SGK05B. Cable 14SAZ20PA is a control cable that monitors the control power supply status for SGK05B. A shor to ground on this cable will blow the control power fuse and disrupt control power to SGK05B.

In the event SGK05B is affected by the fire Class 1E A/C unit SGK05A is available to provide room cooling for required Train A Class 1E equipment. Therefore, loss of SGK05B will have no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-13GK13A, E-13SA20, M-622.1A-00002, E-1F9444

5.1.3 Train B 480 VAC Motor Control Center NG04C

Motor Control Center (MCC) NG04C is located in area A-21. Several Train B PFSSD components could be affected if the fire damages NG04C and disrupts power to those components.

Redundant Train A equipment, powered by Train A 480 VAC Motor Control Centers NG01A, NG01B and NG03C are located in a separate fire area and are unaffected by the fire.

Cubicle NG04CPF2 is the power supply for valve BGHV8104. Valve BGHV8104 is included in the PFSSD design for cold shutdown after a control room fire. The valve is used in OFN RP-017A to establish long term boration for cold shutdown. The valve is not credited for hot standby. Cables associated with the valve are not included in the PFSSD design because the valve can be de-energized and manually opened if needed. A fire in this area that affects valve BGHV8104 will not adversely impact PFSSD.

For further discussion of the cables associated with Train B 480 VAC MCC NG04C that run through area A-21, see Section 5.2.

References: E-15000, XX-E-013, E-13BG13, E-1F9424A, E-1F9424C, E-1F9424D, OFN RP-017A

5.1.4 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B. Source range monitor SENY0061A/B is located in area A-21 and may be unavailable.

Source range monitors SENE0031, SENE0032 and SENY0060A/B are unaffected by a fire in area A-21. Therefore, source range monitoring is available if a fire occurs in area A-21.

For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013, Attachment 3.

References: E-15000, XX-E-013, E-13SE07, E-1F9101

5.2 PFSSD CABLE EVALUATION

Table A-21-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-21. The applicable evaluation section is also listed in Table A-21-4.

Table A-21-4
PFSSD Cables Located in Fire Area A-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12BNI07DA	1501	BNLT0931	I	5.2.1	RWST Level Transmitter
14ABI20HE	1501	ABPV0004	I	5.2.2	Steam Generator D ARV
14ABI20HG	1501	ABPV0004	I	5.2.2	Steam Generator D ARV
14ABI20HH	1501	ABPV0004	I	5.2.2	Steam Generator D ARV
14ABI20HK	1501	ABPV0004	I	5.2.2	Steam Generator D ARV
14ABI21LA	1501	ABPT0516	I	5.2.3	Steam Generator A Pressure
14ABI21WA	1501	ABPT0546	I	5.2.3	Steam Generator D Pressure
14ABK08DA	1501	ABUV0034	C	5.2.4	Cooldown Condenser Dump Valve
14ABK08EA	1501	ABUV0045	C	5.2.4	Cooldown Condenser Dump Valve
14ABK08FA	1501	ABUV0041	C	5.2.4	Cooldown Condenser Dump Valve
14ABK11AA	1501	ABUV0037	C	5.2.4	Cooldown Condenser Dump Valve
14ABK11BA	1501	ABUV0038	C	5.2.4	Cooldown Condenser Dump Valve
14ABK11CA	1501	ABUV0039	C	5.2.4	Cooldown Condenser Dump Valve
14ABK11DA	1501	ABUV0040	C	5.2.4	Cooldown Condenser Dump Valve
14ABK11EA	1501	ABUV0036	C	5.2.4	Cooldown Condenser Dump Valve
14ABK11FA	1501	ABUV0042	C	5.2.4	Cooldown Condenser Dump Valve
14ABK11GA	1501	ABUV0043	C	5.2.4	Cooldown Condenser Dump Valve
14ABK11HA	1501	ABUV0044	C	5.2.4	Cooldown Condenser Dump Valve
14ABK11JA	1501	ABUV0035	C	5.2.4	Cooldown Condenser Dump Valve
14ABK23FA	1501	ABHV0012	C	5.2.5	Main Steam Isolation Valve ABHV0011 Bypass Valve
14ABK23FB	1501	ABHV0015	C	5.2.5	Main Steam Isolation Valve ABHV0014 Bypass Valve

Table A-21-4
PFSSD Cables Located in Fire Area A-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ABK23FC	1501	ABHV0018	C	5.2.5	Main Steam Isolation Valve ABHV0017 Bypass Valve
14ABK23FD	1501	ABHV0021	C	5.2.5	Main Steam Isolation Valve ABHV0020 Bypass Valve
14ABK28AH	1501	ABHV0017	C	5.2.5	Steam Generator B Main Steam Isolation Valve
14ABK28BH	1501	ABHV0011	C	5.2.5	Steam Generator D Main Steam Isolation Valve
14ABK29AH	1501	ABHV0014	C	5.2.5	Steam Generator A Main Steam Isolation Valve
14ABK29BH	1501	ABHV0020	C	5.2.5	Steam Generator C Main Steam Isolation Valve
14AEK16AH	1501	AEFV0040	C	5.2.7	SG B Main Feedwater Isolation Valve
14AEK16BH	1501	AEFV0042	C	5.2.7	SG D Main Feedwater Isolation Valve
14AEK17AH	1501	AEFV0039	C	5.2.7	SG A Main Feedwater Isolation Valve
14AEK17BH	1501	AEFV0041	C	5.2.7	SG C Main Feedwater Isolation Valve
14ALB01B1	1501	DPAL01B	C	5.2.8	Train B MDAFP
14ALB01BD	1501	DPAL01B	C	5.2.8	Train B MDAFP
14ALB01BM	1501	DPAL01B	C	5.2.8	RP118B HS for AFW Pump B
14ALB01BP	1501	DPAL01B	C	5.2.8	Train B MDAFP
14ALB01BR	1501	DPAL01B	C	5.2.8	Train B MDAFP
14ALG02AA	1501	ALHV0034	P	5.2.8	CST To Mtr Driven Aux Feedwater Pump B
14ALG02AB	1501	ALHV0034	C	5.2.8	CST To Mtr Driven Aux Feedwater Pump B
14ALG02AD	1501	ALHV0034	C	5.2.8	CST To Mtr Driven Aux Feedwater Pump B
14ALG02AH	1501	ALHV0034	C	5.2.8	CST To Mtr Driven Aux Feedwater Pump B
14ALG02AJ	1501	ALHV0034	C	5.2.8	CST To Mtr Driven Aux Feedwater Pump B
14ALG02AK	1501	ALHV0034	C	5.2.8	CST To Mtr Driven Aux Feedwater Pump B

Table A-21-4
PFSSD Cables Located in Fire Area A-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALG04AA	1501	ALHV0030	P	5.2.8	ESW To Mtr Driven Aux Feedwater Pump B
14ALG04AB	1501	ALHV0030	C	5.2.8	ESW To Mtr Driven Aux Feedwater Pump B
14ALG04AD	1501	ALHV0030	C	5.2.8	ESW To Mtr Driven Aux Feedwater Pump B
14ALG04AH	1501	ALHV0030	C	5.2.8	ESW To Mtr Driven Aux Feedwater Pump B
14ALG04AJ	1501	ALHV0030	C	5.2.8	ESW To Mtr Driven Aux Feedwater Pump B
14ALG04AK	1501	ALHV0030	C	5.2.8	ESW To Mtr Driven Aux Feedwater Pump B
14ALG04DA	1501	ALHV0033	P	5.2.8	ESW To Turb Driven Aux Feedwater Pump
14ALG04DB	1501	ALHV0033	C	5.2.8	ESW To Turb Driven Aux Feedwater Pump
14ALG04DD	1501	ALHV0033	C	5.2.8	ESW To Turb Driven Aux Feedwater Pump
14ALG04DH	1501	ALHV0033	C	5.2.8	ESW To Turb Driven Aux Feedwater Pump
14ALG04DJ	1501	ALHV0033	C	5.2.8	ESW To Turb Driven Aux Feedwater Pump
14ALG04DK	1501	ALHV0033	C	5.2.8	ESW To Turb Driven Aux Feedwater Pump
14ALI03AG	1501	ALHV0005	I	5.2.8	MDAFW Pump B Discharge to SG D
14ALI03AH	1501	ALHV0005	I	5.2.8	MDAFW Pump B Discharge to SG D
14ALI03AJ	1501	ALHV0005	I	5.2.8	MDAFW Pump B Discharge to SG D
14ALI03AK	1501	ALHV0005	I	5.2.8	MDAFW Pump B Discharge to SG D
14ALI03AL	1501	ALHV0005	I	5.2.8	MDAFW Pump B Discharge to SG D
14ALI03BC	1501	ALHV0007	I	5.2.8	MDAFW Pump B Discharge to SG A
14ALI03BD	1501	ALHV0007	I	5.2.8	MDAFW Pump B Discharge to SG A
14ALI03BE	1501	ALHV0007	I	5.2.8	MDAFW Pump B Discharge to SG A
14ALI03BF	1501	ALHV0007	I	5.2.8	MDAFW Pump B Discharge to SG A
14ALI05AG	1501	ALHV0010	I	5.2.8	TDAFP Discharge to SG B
14ALI05AH	1501	ALHV0010	I	5.2.8	TDAFP Discharge to SG B

Table A-21-4
PFSSD Cables Located in Fire Area A-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALI05AJ	1501	ALHV0010	I	5.2.8	TDAFP Discharge to SG B
14ALI05AK	1501	ALHV0010	I	5.2.8	TDAFP Discharge to SG B
14ALI05AN	1501	ALHV0010	I	5.2.8	TDAFP Discharge to SG B
14ALI05BC	1501	ALHV0012	I	5.2.8	TDAFP Discharge to SG C
14ALI05BD	1501	ALHV0012	I	5.2.8	TDAFP Discharge to SG C
14ALI05BE	1501	ALHV0012	I	5.2.8	TDAFP Discharge to SG C
14ALI05BF	1501	ALHV0012	I	5.2.8	TDAFP Discharge to SG C
14ALI07AD	1501	ALFT0001	I	5.2.8	AFW to SG D Flow Transmitter
14ALI07AE	1501	ALFT0001	I	5.2.8	AFW to SG D Flow Transmitter
14ALI07HD	1501	ALPT0024	I	5.2.8	MDAFP B Suction Pressure
14ALI07HE	1501	ALPT0024	I	5.2.8	MDAFP B Suction Pressure
14ALI08CA	1501	ALPT0039	I	5.2.9	ESFAS Low Suction Pressure
14ALI09AA	1501	ALFT0007	I	5.2.8	AFW to SG A Flow Transmitter
14ALK01BA	1501	DPAL01B	C	5.2.8	Train B MDAFP
14ALY09AB	1501	ALHV0005	I	5.2.8	MDAFW Pump B Discharge to SG D
14ALY09AD	1501	ALHV0005	I	5.2.8	MDAFW Pump B Discharge to SG D
14ALY09BB	1501	ALHV0007	I	5.2.8	MDAFW Pump B Discharge to SG A
14ALY09BD	1501	ALHV0007	I	5.2.8	MDAFW Pump B Discharge to SG A
14BBG04AA	1501	BBHV8351A	P	5.2.10	RCP Seal Water Injection Valve
14BBG04AB	1501	BBHV8351A	C	5.2.10	RCP Seal Water Injection Valve
14BBG04AC	1501	BBHV8351A	C	5.2.10	RCP Seal Water Injection Valve
14BBG04BA	1501	BBHV8351B	P	5.2.10	RCP Seal Water Injection Valve
14BBG04BB	1501	BBHV8351B	C	5.2.10	RCP Seal Water Injection Valve

Table A-21-4
PFSSD Cables Located in Fire Area A-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BBG04BC	1501	BBHV8351B	C	5.2.10	RCP Seal Water Injection Valve
14BBG04CA	1501	BBHV8351C	P	5.2.10	RCP Seal Water Injection Valve
14BBG04CB	1501	BBHV8351C	C	5.2.10	RCP Seal Water Injection Valve
14BBG04CC	1501	BBHV8351C	C	5.2.10	RCP Seal Water Injection Valve
14BBG04DA	1501	BBHV8351D	P	5.2.10	RCP Seal Water Injection Valve
14BBG04DB	1501	BBHV8351D	C	5.2.10	RCP Seal Water Injection Valve
14BBG04DC	1501	BBHV8351D	C	5.2.10	RCP Seal Water Injection Valve
14BBK30BA	1501	BBHV8001B	C	5.2.11	RCS Head Vent Valve
14BGG11AA	1501	BGHV8105	P	5.2.12	Charging Pumps to Regen Hx/Ctmt Iso Vlv
14BGG11AB	1501	BGHV8105	C	5.2.12	Charging Pumps to Regen Hx/Ctmt Iso Vlv
14BGG11AC	1501	BGHV8105	C	5.2.12	Charging Pumps to Regen Hx/Ctmt Iso Vlv
14BGG12BA	1501	BGLCV0112C	P	5.2.13	VCT Outlet Isolation Valve
14BGG12BB	1501	BGLCV0112C	C	5.2.13	VCT Outlet Isolation Valve
14BGI51DA	1501	BGLT0185	I	5.2.13	VCT Level Transmitter
14BGK48AB	1501	BGHV8153B	C	5.2.14	Excess Letdown Isolation Valve
14BMK06AA	1501	BMHV0001	C	5.2.15	SG A to Blowdown Flash Tank Isolation Valve
14BMK06BA	1501	BMHV0002	C	5.2.15	SG B to Blowdown Flash Tank Isolation Valve
14BMK06CA	1501	BMHV0003	C	5.2.15	SG C to Blowdown Flash Tank Isolation Valve
14BMK06DA	1501	BMHV0004	C	5.2.15	SG D to Blowdown Flash Tank Isolation Valve
14EFG04BA	1501	EFHV0060	P	5.2.16	ESW B Return From CCW Hx B Isolation Valve
14EFG04BB	1501	EFHV0060	C	5.2.16	ESW B Return From CCW Hx B Isolation Valve
14EFG04BC	1501	EFHV0060	C	5.2.16	ESW B Return From CCW Hx B Isolation Valve
14EFG05BA	1501	EFHV0052	P	5.2.16	ESW B to CCW Hx B Isolation Valve

Table A-21-4
PFSSD Cables Located in Fire Area A-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EFG05BB	1501	EFHV0052	C	5.2.16	ESW B to CCW Hx B Isolation Valve
14EFG05BC	1501	EFHV0052	C	5.2.16	ESW B to CCW Hx B Isolation Valve
14EGG05BA	1501	EGHV0016	P	5.2.17	CCW B Return from Nuclear Aux Components
14EGG05BB	1501	EGHV0016	C	5.2.17	CCW B Return from Nuclear Aux Components
14EGG05BC	1501	EGHV0016	C	5.2.17	CCW B Return from Nuclear Aux Components
14EGG05BD	1501	EGHV0016	P	5.2.17	CCW B Return from Nuclear Aux Components
14EGG05BE	1501	EGHV0016	C	5.2.17	CCW B Return from Nuclear Aux Components
14EGG05DA	1501	EGHV0054	P	5.2.17	CCW B to Nuclear Aux Components
14EGG05DB	1501	EGHV0054	C	5.2.17	CCW B to Nuclear Aux Components
14EGG05DC	1501	EGHV0054	C	5.2.17	CCW B to Nuclear Aux Components
14EGG05DD	1501	EGHV0054	C	5.2.17	CCW B to Nuclear Aux Components
14EGG05DE	1501	EGHV0054	C	5.2.17	CCW B to Nuclear Aux Components
14EGG05DF	1501	EGHV0054	P	5.2.17	CCW B to Nuclear Aux Components
14EGG07BA	1501	EGHV0102	P	5.2.25	CCW B to RHR B Heat Exchanger
14EGG07BB	1501	EGHV0102	C	5.2.25	CCW B to RHR B Heat Exchanger
14EGG07BC	1501	EGHV0102	C	5.2.25	CCW B to RHR B Heat Exchanger
14EGG09CA	1501	EGHV0071	P	5.2.17	CCW to RCP Thermal Barrier
14EGG09CB	1501	EGHV0071	C	5.2.17	CCW to RCP Thermal Barrier
14EGG09CC	1501	EGHV0071	C	5.2.17	CCW to RCP Thermal Barrier
14EGG09CD	1501	EGHV0071	C	5.2.17	CCW to RCP Thermal Barrier
14EGG18BA	1501	EGHV0127	P	5.2.17	CCW to RCP Thermal Barrier
14EGG18BB	1501	EGHV0127	C	5.2.17	CCW to RCP Thermal Barrier
14EGG18DA	1501	EGHV0133	P	5.2.17	CCW from RCP Thermal Barrier

Table A-21-4
PFSSD Cables Located in Fire Area A-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EGG18DB	1501	EGHV0133	C	5.2.17	CCW from RCP Thermal Barrier
14EGI15AA	1501	EGFT0062	I	5.2.17	CCW Flow from RCP Thermal Barriers
14EGI19BB	1501	EGFT0129	I	5.2.17	CCW to RCP Flow Transmitter
14EGK16BC	1501	EGTV0030	C	5.2.17	CCW B Heat Exchanger Temp Control Vlv
14EJG06BT	1501	EJHV8811B	C	5.2.24	CTMT Recirc Sump To RHR Pump B
14EMG02BA	1501	EMHV8803B	P	5.2.18	CCP B to BIT Isolation Valve
14EMG02BB	1501	EMHV8803B	C	5.2.18	CCP B to BIT Isolation Valve
14EMG02BC	1501	EMHV8803B	C	5.2.18	CCP B to BIT Isolation Valve
14EMG02DA	1501	EMHV8801B	P	5.2.18	Train B BIT Outlet Valve
14EMG02DB	1501	EMHV8801B	C	5.2.18	Train B BIT Outlet Valve
14EMG02DE	1501	EMHV8801B	C	5.2.18	Train B BIT Outlet Valve
14FCK21AA	1501	FCFV0310	C	5.2.19	TDAFP Steam Trap Drain Valve
14GFG01BA	1501	SGF02B	P	5.2.8	Train B Aux Feedwater Pump Room Cooler
14GFG01BB	1501	SGF02B	C	5.2.8	Train B Aux Feedwater Pump Room Cooler
14GFG01BC	1501	SGF02B	C	5.2.8	Train B Aux Feedwater Pump Room Cooler
14GKG02BA	1501	SGK04B	P	5.1.1	Train B Control Room A/C Unit
14GKG02BE	1501	SGK04B	C	5.1.1	Train B Control Room A/C Unit
14GKG02BF	1501	SGK04B	C	5.1.1	Train B Control Room A/C Unit
14GKG02BG	1501	SGK04B	C	5.1.1	Train B Control Room A/C Unit
14GKG02BH	1501	SGK04B	C	5.1.1	Train B Control Room A/C Unit
14GKG02DA	1501	SGK04B	C	5.1.1	Train B Control Room A/C Unit
14GKG02DB	1501	SGK04B	C	5.1.1	Train B Control Room A/C Unit
14GKG02DC	1501	SGK04B	C	5.1.1	Train B Control Room A/C Unit

Table A-21-4
PFSSD Cables Located in Fire Area A-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GKG02DD	1501	SGK04B	C	5.1.1	Train B Control Room A/C Unit
14GKG02DE	1501	SGK04B	C	5.1.1	Train B Control Room A/C Unit
14GKG02DF	1501	SGK04B	C	5.1.1	Train B Control Room A/C Unit
14GKG02DG	1501	SGK04B	C	5.1.1	Train B Control Room A/C Unit
14GKG02DH	1501	SGK04B	P	5.1.1	Train B Control Room A/C Unit
14GKG02DJ	1501	SGK04B	P	5.1.1	Train B Control Room A/C Unit
14GKG02DK	1501	SGK04B	P	5.1.1	Train B Control Room A/C Unit
14GKG02DL	1501	SGK04B	P	5.1.1	Train B Control Room A/C Unit
14GKG13BE	1501	SGK05B	C	5.1.2	Train B Class 1E Electrical Eq A/C Unit
14GKG13BF	1501	SGK05B	C	5.1.2	Train B Class 1E Electrical Eq A/C Unit
14GKG13BK	1501	SGK05B	C	5.1.2	Train B Class 1E Electrical Eq A/C Unit
14GKG13BL	1501	SGK05B	C	5.1.2	Train B Class 1E Electrical Eq A/C Unit
14GKG13BM	1501	SGK05B	C	5.1.2	Train B Class 1E Electrical Eq A/C Unit
14GKY02BB	1501	GKHZ0040B	C	5.1.1	Control Room A/C Unit SGK04B Outlet Damper
14GKY02BC	1501	GKHZ0040A	C	5.1.1	Control Room A/C Unit SGK04B Inlet Damper
14GKY02BD	1501	GKHZ0040A/B	C	5.1.1	Control Room A/C Unit SGK04B In/Out Damper
14GKY02BE	1501	GKHZ0040A/B	C	5.1.1	Control Room A/C Unit SGK04B In/Out Damper
14GLG06BA	1501	SGL11B	P	5.2.17	Train B CCW Pump Room Cooler
14GLG06BC	1501	SGL11B	C	5.2.17	Train B CCW Pump Room Cooler
14GLG06BD	1501	SGL11B	C	5.2.17	Train B CCW Pump Room Cooler
14GNG02BJ	1501	DSGN01B	C	5.2.21	Train B Containment Cooler
14GNG02BK	1501	DSGN01B	C	5.2.21	Train B Containment Cooler
14GNG02DJ	1501	DSGN01D	C	5.2.21	Train B Containment Cooler

Table A-21-4
PFSSD Cables Located in Fire Area A-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GNG02DK	1501	DSGN01D	C	5.2.21	Train B Containment Cooler
14GNI05DA	1501	GNPT0934	I	5.2.3	Containment Pressure Transmitter
14JEG01BD	1501	DPJE01B	C	5.2.6	Train B EDG Fuel Oil Transfer Pump
14NGG01AD	1501	NG02BAF1	P	5.2.20	Incoming Feed to Motor Control Center NG02B
14NGG01AE	1501	NG02BAF1	P	5.2.20	Incoming Feed to Motor Control Center NG02B
14NGG01AJ	1501	DSGN01B	P	5.2.21	Containment Cooler B
14NGG01BB	1501	NG04CMF1	P	5.2.20	Incoming Feed to Motor Control Center NG04C
14NGG01BC	1501	NG04CMF1	P	5.2.20	Incoming Feed to Motor Control Center NG04C
14NGG01BF	1501	DSGN01D	P	5.2.21	Containment Cooler D
14RPK15BA	1501	86XRP5	C	5.2.22	ALHV0030 and ALHV0034 lockout relay
14RPK15CA	1501	86XRP6	C	5.2.22	ALHV0033 and ABPV0004 lockout relay
14RPK15DA	1501	86XRP7	C	5.2.22	AFW Pump B Motor DPAL01B lockout relay
14SAZ20EA	1501	GKHZ0040A/B	C	5.1.1	Control Room A/C Unit SGK04B In/Out Damper
14SAZ20GA	1501	SGK04B	C	5.1.1	Control Room A/C Unit
14SAZ20NA	1501	SGK04B	C	5.1.1	Control Room A/C Unit
14SAZ20PA	1501	SGK05B	C	5.1.2	Train B Class 1E Electrical Eq A/C Unit
14SBS16AA	1501	BBTI0423X	I	5.2.23	RCS Cold Leg Temp Indicator (WR) Loop 2
14SBS16EA	1501	BBTI0443A	I	5.2.23	RCS Hot Leg Temp Indicator (WR) Loop 4
14SBS16MA	1501	AELI0517X	I	5.2.23	Steam Generator A Narrow Range Water Level
14SBS16NA	1501	BBPI0406X	I	5.2.23	RCS Pressure Wide Range Hot Leg
14SBS16PA	1501	AELI0537X	I	5.2.23	Steam Generator C Narrow Range Water Level
14SBS16XA	1501	AELI0502A	I	5.2.23	Steam Generator B Wide Range Water Level
14SBS16YA	1501	AELI0504A	I	5.2.23	Steam Generator D Wide Range Water Level

Table A-21-4
PFSSD Cables Located in Fire Area A-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14SBS16ZA	1501	BBLI0460B	I	5.2.23	Pressurizer Level Indicator (Narrow Range)
14SES07AC	1501	SENY0061A/B	I	5.1.4	Source Range Monitor
14SES07AD	1501	SENY0061A/B	I	5.1.4	Source Range Monitor
14SES07AE	1501	SENY0061A/B	I	5.1.4	Source Range Monitor
14SES07BA	1501	SENY0061B	I	5.1.4	Source Range Monitor
14SES07BB	1501	SENY0061B	I	5.1.4	Source Range Monitor
14SES07BC	1501	SENY0061B	I	5.1.4	Source Range Monitor
14SES07CA	1501	SENY0061A	I	5.1.4	Source Range Monitor

5.2.1 Refueling Water Storage Tank

The RWST is credited in the PFSSD analysis as the primary source of borated water to achieve cold shutdown. The Wolf Creek Technical Specifications ensure the minimum quantity and boron concentration is maintained to achieve cold shutdown. Therefore, RWST level transmitters, indicators and circuits are not evaluated for level indication.

The RWST level transmitters and associated circuits are included in the PFSSD analysis because of the automatic functions they perform. A low level in the RWST on 2 out of 4 RWST level transmitters, coincident with a safety injection signal, will initiate a swapover, which is not desired for PFSSD because it could cause the RWST to drain to the containment sump.

A cable associated with refueling water storage tank (RWST) level transmitter BNLT0931 runs in fire area A-21. Cables for the remaining RWST level transmitters are unaffected. Therefore, a spurious low-low level in the RWST is not credible if a fire occurs in this area.

Based on the above discussion, the RWST is available if a fire occurs in area A-21.

References: E-15000, XX-E-013, E-13BN07, E-13EJ06A, E-13EJ06B, E-1F9102, E-1F9205, E-1F9302, M-12BN01, M-12EJ01, M-767-00162, M-767-00165, M-767-00168, M-767-00189

5.2.2 Steam Generator Atmospheric Relief Valves

Cables associated with Steam Generator Atmospheric Relief Valve ABPV0004 are run in area A-21. Cables associated with Steam Generator Atmospheric Relief Valves ABPV0001, ABPV0002 and ABPV0003 are not run in area A-21.

PFSSD requires at least two steam generator atmospheric relief valves (ARV) be controlled and the other two closed. The ARVs are normally closed and require air pressure to open. Each valve is controlled by a pressure transmitter input signal from a pressure transmitter installed on the outlet side of the steam generator. The relief valve opens when the pressure reaches a designated setpoint.

Damage to the instrument cables associated with pressure transmitter ABPT0004 or I/P converter ABPY0004 could provide a false high steamline pressure signal and open ARV ABPV0004. Since cables associated with the other three ARVs are not run in area A-21, they will remain closed. A single open ARV is bounded by the main steamline break analysis and will not adversely impact PFSSD. If necessary, operators can fail the ARV closed by closing the air and nitrogen supply valves KAV1429 and KAV1365, respectively. These valves are located in fire area A-23 and access is available without having to traverse area A-21.

Based on the above discussion, a fire in area A-21 will not prevent the control of two Steam Generator Atmospheric Relief Valves and the closure of the remaining two.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB20B, E-1F9101, M-12AB01, M-12KA04, M-12KA05

5.2.3 Safety Injection and Containment Spray

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. During operation and hot standby, where the RCS is greater than 1,000 psi, the SI pumps will operate on minimum flow and re-circulate water back to the RWST. Therefore, a spurious start of the SI pumps will not impact PFSSD, but should be stopped for cold shutdown.

A spurious containment spray actuation signal (CSAS) could cause the containment spray pumps to operate, depleting inventory in the RWST. Mitigation of a spurious CSAS should occur prior to the RWST volume going below the minimum necessary to achieve cold shutdown conditions.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and, ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Containment spray (CS) is initiated automatically by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937.

Cables run through fire area A-21 associated with these pressure transmitters are summarized in Table A-21-4.

Cables associated with GNPT0935, GNPT0936 and GNPT0937 are not run in area A-21. Only cables associated with GNPT0934 are run in area A-21. Therefore, a fire in area A-21 will not cause a spurious SIS or CSAS due to high containment pressure.

Cables associated with all four pressurizer pressure transmitters are not run in area A-21. Therefore, a spurious SIS due to low pressurizer pressure is not credible for a fire in area A-21.

Cables associated with steam line pressure transmitters ABPT0516 and ABPT0546 are run in area A-21. Cables associated with the remaining steam line pressure transmitters are not run in area A-21. Therefore, a spurious SIS due to low steam line pressure is not credible for a fire in area A-21.

Based on the above discussion, a spurious SIS or CSAS is not credible if a fire occurs in fire area A-21.

References: E-15000, XX-E-013, E-13AB21, E-13GN05, E-1F9431, M-12AB01, M-12GN01

5.2.4 Main Steam Isolation Valves Downstream Components

Cables for several valves located downstream of the main steam isolation valves (MSIV) are located in this area. These valves are used for PFSSD to isolate the main steam lines in the event the MSIVs or MSIV bypass valves fail to close.

As discussed in Section 5.2.5, the MSIVs and the MSIV bypass valves can be isolated using hand switch ABHS0080 if a fire occurs in area A-21. Cables associated with hand switch ABHS0080 are run in a different fire area and are unaffected by a fire in area A-21. Therefore, these downstream isolation valves can fail open with no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-13AB08, E-13AB11A, E-13AB11B, E-13AB11C, E-1F9101, E-1F9103, M-12AB02, M-12AB03

5.2.5 Steam Generator Main Steam Isolation Valves (MSIVs) and Bypass Valves

PFSSD requires the MSIVs and bypass valves be closed to prevent reactivity addition due to uncontrolled cooldown. The MSIVs and bypass valves are closed from the control room using all close hand switches ABHS0079 or ABHS0080.

Each MSIV is designed to utilize system fluid (main steam) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main steam. This is done by actuating either all close hand switch ABHS0079 (separation group 4) or ABHS0080 (separation group 1) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MSIV	ABHS0079 (Sep Group 4)		ABHS0080 (Sep Group 1)	
	Solenoids	Cable	Solenoids	Cable
ABHV0011	MV2, MV4, MV6	14ABK28BH	MV1, MV3, MV5	11ABK29BH
ABHV0014	MV2, MV4, MV6	14ABK29AH	MV1, MV3, MV5	11ABK28AH
ABHV0017	MV2, MV4, MV6	14ABK28AH	MV1, MV3, MV5	11ABK29AH
ABHV0020	MV2, MV4, MV6	14ABK29BH	MV1, MV3, MV5	11ABK28BH

All 4 cables associated with the 12 separation group 4 solenoid valves are run in area A-21. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 1 cables associated with hand switch ABHS0080 are unaffected by a fire in area A-21. Therefore, hand switch ABHS0080 is available to close the four MSIVs.

Each MSIV bypass valve is normally closed and is required to remain closed for PFSSD. Two (2) redundant solenoid valves (one on each train) are installed on the air supply line and control air to the pneumatic actuator. The valves are normally closed with the solenoid valves de-energized. Actuation of either hand switch ABHS0079 or ABHS0080 will de-energize power to the solenoids to ensure they remain closed.

Cables associated with the 4 separation group 4 solenoids associated with each bypass valve are run in area A-21. Cables associated with the 4 separation group 1 solenoids associated with each bypass valve are unaffected by a fire in area A-21. Therefore, hand switch ABHS0080 is available to close the MSIV bypass valves.

Based on the above discussion, hand switch ABHS0080 is available to close the MSIVs and MSIV bypass valves in the event of a fire in area A-21.

References: E-15000, XX-E-013, E-13AB23A, E-13AB23B, E-13AB26, E-13AB27, E-13AB28, E-13AB29, E-1F9101, M-12AB02

5.2.6 Emergency Diesel Fuel Oil Transfer Pump

Emergency diesel fuel oil transfer pumps are required to transfer fuel oil from the underground storage tank to the aboveground day tank to support operation of the emergency diesel generator (EDG). Loss of the fuel oil transfer pump on the associated train will prevent operation of the associated EDG.

Cable 14JEG01BD is run in fire area A-21. A short to ground on this cable will blow the control power fuse and prevent operation of the Train B EDG fuel oil transfer pump. The Train B EDG can operate for approximately 1 hour fully loaded on the contents of the day tank.

A fire in area A-21 credits Train A components using off-site and on-site power to NB01. Therefore, loss of the Train B EDG due to a fire in this area will not affect PFSSD.

References: XX-E-013, E-15000, E-13JE01A, E-1F9411B

5.2.7 Steam Generator Main Feedwater Isolation Valves

PFSSD requires that either the main feedwater isolation valves (MFIVs) be closed or the main feedwater pumps be stopped to prevent overfilling the steam generators. Flow diversion from auxiliary feedwater (AFW) to the main feedwater system piping is prevented by check valves AEV0420, AEV0421, AEV0422 and AEV0423. Closure of the main feedwater isolation valves is not required to prevent AFW flow diversion.

Each MFIV is designed to utilize system fluid (feedwater) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main feedwater. This is done by actuating either all close hand switch AEHS0080 (separation group 1) or AEHS0081 (separation group 4) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MFIV	AEHS0080 (Sep Group 1)		AEHS0081 (Sep Group 4)	
	Solenoids	Cable	Solenoids	Cable
AEFV0039	MV1, MV3, MV5	11AEK16AH	MV2, MV4, MV6	14AEK17AH
AEFV0040	MV1, MV3, MV5	11AEK17AH	MV2, MV4, MV6	14AEK16AH
AEFV0041	MV1, MV3, MV5	11AEK16BH	MV2, MV4, MV6	14AEK17BH
AEFV0042	MV1, MV3, MV5	11AEK17BH	MV2, MV4, MV6	14AEK16BH

All 4 cables associated with the 12 separation group 4 solenoid valves are run in area A-21. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 1 cables associated with hand switch AEHS0080 are unaffected by a fire in area A-21. Therefore, hand switch AEHS0080 is available to close the four MFIVs if a fire occurs in area A-21.

Based on the above discussion, MFIV isolation is assured using hand switch AEHS0080 if a fire occurs in area A-21.

References: E-15000, XX-E-013, E-13AE14, E-13AE15, E-13AE16, E-13AE17, E-1F9201, M-12AE02

5.2.8 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

Based on Table A-21-4, cables for several components associated with Train B MDAFP and the TDAFP are run in area A-21. The suction source from both the CST and the ESW system to the B Train MDAFP could be disrupted due to spurious closure of the suction valves (ALHV0030 and ALHV0034). The Train B MDAFP discharge valves to SGs A and D (ALHV0007 and ALHV0005) could spuriously close due to cable damage. Also, damage to cable 14ALB01BM could cause the Train B MDAFP to spuriously stop. Therefore, the Train B MDAFP is unavailable to supply AFW for decay heat removal.

The Train B ESW supply to the TDAFP may be affected by the fire due to damage to cables associated with ALHV0033. The CST and the Train A ESW supplies remain available. The TDAFP may not be capable of supplying AFW to SGs B and C due to damage to cables associated with valves ALHV0010 and ALHV0012. The TDAFP supply to SGs A and D, through valves ALHV0008 and ALHV0006, respectively, is unaffected by the fire. However, as stated in Section 5.2.2 above, steam generator D ARV ABPV0004 may be affected by the fire and may not function as required.

Cables associated with AFW to SG D flow transmitter ALFT0001 and AFW to SG A flow transmitter ALFT0007 are run in area A-21. Damage to these cables could provide false flow indication to operators in the control room.

Cables associated with MDAFP B suction pressure transmitter ALPT0024 are run in area A-21. this transmitter provides suction pressure indication in the control room. False low suction pressure due to cable damage will generate a signal to open the ESW supply source. This will not prevent achieving PFSSD.

Cables for Train A MDAFP and associated suction and discharge valves and transmitters are run in a separate fire area and are unaffected. Consequently, MDAFP A is available in the event of a fire in area A-21. Damage to cables associated with B Train MDAFP and the TDAFP will not prevent auxiliary feedwater flow to at least two steam generators.

Cables associated with Train B MDAFP room cooler SGF02B are run in area A-21. Damage to these cables could prevent operation of the room cooler which would result in inoperability of the Train B MDAFP.

Cables associated with Train A MDAFP room cooler SGF02A are run in a different fire area. Therefore, the Train A MDAFP room cooler is unaffected by a fire in area A-21.

References: E-15000, XX-E-013, E-1F9204, E-13AL01B, E-13AL03B, E-13AL05A, E-13AL05B, E-13AL07B, E-13AL09, E-13GF01

5.2.9 Condensate Storage Tank Suction Pressure

The preferred suction source for auxiliary feedwater (AFW) is the condensate storage tank (CST). This tank provides a clean source of water to the steam generators. Upon low CST pressure, the suction source transfers to essential service water (ESW).

Three pressure transmitters are installed on the suction piping from the CST to the AFW pumps. These transmitters indicate CST pressure in the control room and automatically transfer the AFW suction to ESW upon low pressure on two out of three pressure transmitters.

Circuits for one of the three pressure transmitters (ALPT0039) run through area A-21. Damage to these circuits could prevent the pressure transmitter from functioning. Circuits for the remaining pressure transmitters (ALPT0037 and ALPT0038) are not run through area A-21. Therefore, CST level indication is available in the control room and a spurious transfer to the ESW system is avoided.

A fire in area A-21 will not affect CST level indication and will not actuate a spurious low AFW suction pressure signal.

References: E-15000, XX-E-013, E-1F9202, E-13AL08, M-12AL01

5.2.10 Reactor Coolant Pump (RCP) Seal Injection

PFSSD requires RCP seal injection to provide a boron injection path, provide makeup to the RCS to maintain hot standby inventory and prevent damage to the RCP seals. The Component Cooling Water (CCW) system is an alternative means of cooling the RCP seals.

A fire in area A-21 could damage power and control cables associated with all four RCP seal injection valves (BBHV8351A, BBHV8351B, BBHV8351C and BBHV8351D). The seal injection valves are normally open and de-energized with the circuit breaker maintained in the OFF position. The valves are not high/low pressure interface valves so three-phase hot shorts do not have to be considered and, consequently, damage to the power cables will not cause the valves to spuriously close. Damage to the control cables will not cause the valves to close because the power and control circuits are de-energized. Therefore, a fire in this area will not cause the seal injection valves to close.

Based on the above discussion, RCP seal injection is available.

References: E-15000, XX-E-013, E-1F9303, E-13BB04

5.2.11 Reactor Head Vent Valves

PFSSD requires that one of the two reactor vessel head vent valves on each flow path (2 flow paths total) be closed to prevent uncontrolled depressurization of the RCS. A cable (14BBK30BA) associated with one of the four head vent valves (BBHV8001B) runs through area A-21.

Cables for remaining head vent valves BBHV8001A, BBHV8002A and BBHV8002B are not run through A-21 and are unaffected by the fire. Therefore, at least one valve on each flow path can be controlled and spurious opening of BBHV8001B will have no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-1F9301, E-13BB30, M-12BB04

5.2.12 Charging Flow to Regenerative Heat Exchanger Isolation Valves

PFSSD requires charging flow to be directed to the RCP seals. To ensure adequate flow to the RCP seals, flow diversion to the regenerative heat exchanger needs to be prevented. Valves BGHV8105 and BGHV8106 are included in the PFSSD equipment list to accomplish this task. Manual valve BG8402B is also included to provide an alternate means of closing this flow path during alternate safe shutdown using OFN RP-017.

Cables associated with BGHV8105 are run in area A-21 and could be damaged by a fire, preventing valve BGHV8105 from being closed from the control room. However, cables associated with valve BGHV8106, and its hand switch (BGHIS8106), are unaffected by a fire in area A-21. Therefore, valve BGHV8106 can be used to isolate flow to the regenerative heat exchanger and therefore satisfy the PFSSD requirement.

References: E-15000, XX-E-013, E-1F9102, E-13BG11A, M-12BG03

5.2.13 Volume Control Tank (VCT) Discharge Valves

PFSSD requires isolation of the Volume Control Tank (VCT) discharge to charging pumps suction. Either valve BGLCVC0112B or BGLCV0112C needs to be closed. Cables run in area A-21 associated with valve BGLCV0112C are listed in Table A-21-4.

Damage to cables 14BGG12BA and 14BGG12BB will prevent closing valve BGLCV0112C from the control room. Therefore, valve BGLCV0112C is unavailable to perform its PFSSD function if a fire occurs in area A-21. Damage to these cables will not cause the valve to spuriously close. A three-phase hot short is not required to be considered since the valve is not a high-low pressure interface. Therefore, damage to the operating charging pump due to spurious closure of this valve is not credible.

Cable 14BGI51DA is an instrumentation cable for VCT level transmitter BGLT0185. Damage to this cable could send a false VCT low-low level signal and close relay K647 on the close circuit for valve BGLCV0112C. This would fail the valve closed if all other permissives are met, which is the desired PFSSD position. Therefore, damage to this cable will have no impact on the ability to close the valve. Redundant VCT level transmitter BGLT0112 is unaffected by a fire in area A-21 and remains available to provide reliable VCT level indication in the control room.

Power and control cables for BGLCV0112B are run in a separate fire area and are unaffected by a fire in area A-21. Therefore, VCT isolation can be accomplished using BGLCV0112B.

References: E-15000, XX-E-013, E-1F9102, E-13BG12, E-13BG12A, E-13BG51, M-12BG03

5.2.14 Excess Letdown

PFSSD requires the excess letdown path be isolated to prevent uncontrolled depressurization of the RCS. To accomplish this, either normally closed valve BGHV8153A or BGHV8154A must be maintained closed and either normally closed valve BGHV8153B or BGHV8154B must be maintained closed.

Only one cable associated with valve BGHV8153B is run in area A-21. Cables associated with the remaining three excess letdown isolation valves are not run in area A-21. Therefore, excess letdown is assured using BGHV8154B and either BGHV8153A or BGHV8154A.

References: E-15000, XX-E-013, E-1F9301, E-13BG48, M-12BG01

5.2.15 Steam Generator Blowdown to Blowdown Flash Tank Isolation Valves

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown. Cables run in area A-21 associated with these valves are listed in Table A-21-4.

A hot short within cables 14BMK06AA, 14BMK06BA, 14BMK06CA and14BMK06DA will not cause the valves to spuriously open due to the absence of a +125 VDC source conductor. However, the cables are run in raceway that could contain other cables carrying 125 VDC that, if an inter-cable hot short occurs, could spuriously open the valves and prevent them from being closed using hand switches BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A. Although this is unlikely due to the use of thermoset cables, it is postulated to occur for the purposes of this analysis.

Redundant means for closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 are available and are unaffected by a fire in area A-21. This redundant means uses BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C, located on the BM157 panel in the radwaste control room. Access to the radwaste control room is available from outside fire area A-21.

Based on the above discussion, a fire in area A-21 will not prevent closing steam generator blowdown valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004.

Thermal hydraulic analysis WCNOC-CP-002 shows insignificant impact on SG inventory even with all four blowdown valves open. Therefore, no E-1F9900 OMA is required to close blowdown valves to achieve and maintain hot standby. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 34.

References: E-15000, XX-E-013, E-1F9101, E-13BM06A, E-13BM06D, M-12BM01

5.2.16 Essential Service Water to/from Component Cooling Water Valves

EFHV0052 is the Essential Service Water (ESW) Train B to CCW Train B heat exchanger supply isolation valve and is required to be open when using Train B for PFSSD. EFHV0060 is the return isolation valve from CCW Train B heat exchanger to the Ultimate Heat Sink (UHS). PFSSD requires that EFHV0060 be closed when using Train B CCW for plant shutdown following a fire and that valve EFV0090 be maintained in a locked throttled position to provide the minimum required ESW water flow. If valve EFHV0060 were to spuriously open when operating Train B ESW, flow imbalance could occur, which will result in flow depletion and inoperability of essential PFSSD components.

Cables 14EFG05BA, 14EFG05BB and 14EFG05BC are power and control cables associated with EFHV0052. Cables 14EFG04BA, 14EFG04BB and 14EFG04BC are power and control cables associated with EFHV0060. A fire in area A-21 will result in damage to these cables and the inability to control ESW flow to Train B CCW.

Hand switch EFHS0052 is the control room isolation switch associated with valve EFHV0052. Hand switch EFHS0060 is the control room isolation switch associated with valve EFHV0060. Damage to either of these switches could prevent operation of the associated valves from the control room or could cause spurious operation of the valves.

Cables associated with Train A ESW to/from CCW valves are run in a different fire area and are unaffected by a fire in area A-21.

Based on the above discussion, at least one Train of ESW to CCW valves will be available if a fire occurs in area A-21.

References: E-15000, XX-E-013, E-13EF04, E-13EF04A, E-13EF05, M-12EF02

5.2.17 Component Cooling Water

The component cooling water system is required for PFSSD to provide cooling water to the CCP oil coolers, seal water heat exchanger, RHR heat exchanger, RHR pump seal cooler and RCP thermal barriers (to maintain RCP seal cooling in the event RCP seal injection is lost). In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Cables associated with components on the Train B CCW system run through area A-21. Damage to these cables due to a fire could prevent operation of the associated equipment and prevent operation of Train B CCW. Cables associated with redundant Train A CCW are run in a different fire area and are unaffected by the fire.

To ensure an operable CCW flow path, either valves EGHV0071 or EGHV0126 must be open and either EGHV0058 or EGHV0127 must be open. In addition, either valves EGHV0062 or EGHV0132 must be open and either EGHV0061 or EGHV0133 must be open. Also, valves EGHV0015 and EGHV0053 need to be open when operating the Train A CCW system and valves EGHV0016 and EGHV0054 need to be open when operating the Train B CCW system to ensure a flow path to and from the service loop.

Cables associated with valves EGHV0054, EGHV0071, EGHV0127 and EGHV0133 run through area A-21. In addition, cable 14EGI15AA, associated with flow transmitter EGFT0062, runs in fire area A-21. The flow transmitter monitors CCW outlet flow from the thermal barriers and automatically shuts valve EGHV0062 on a high flow signal. Cables associated with other thermal barrier cooling flow path valves are unaffected by the fire.

If the fire affects cables associated with flow transmitter EGFT0062 or valve EGHV0071, valves EGHV0062 or EGHV0071 may spuriously close. If this occurs and it is desired to have CCW flow to the thermal barriers, Operators would need to open valves EGHV0126 or EGHV0132. Valves EGHV0126 and EGHV0132 are unaffected by the fire.

Cable 14EGI19BB is associated with CCW to RCP flow transmitter EGFT0129. Damage to this cable could prevent operators from diagnosing a loss of CCW flow to the RCP thermal barriers using flow indicator EGFI0129. CCW to RCP flow indicator EGFI0128 is unaffected by a fire in area A-21 and can be used to diagnose a loss of CCW flow to the RCP thermal barriers.

Cables associated with Train B CCW pump room cooler SGL11B are run in area A-21. Damage to these cables could cause a loss of capability to cool the Train B CCW pumps. The Train A CCW pump room cooler is unaffected by the fire since cables for this unit are not run in area A-21.

As discussed in Section 5.2.10, RCP seal injection is unaffected by a fire in area A-21. Therefore, loss of thermal barrier cooling will have no adverse impact on PFSSD.

Based on the above discussion, Train A CCW is available to provide cooling to essential PFSSD components. Loss of CCW flow to the RCP thermal barriers can be diagnosed using flow indicator EGFI0128. RCP seal injection remains available.

References: E-15000, XX-E-013, E-13EG05A, E-13EG05B, E-13EG05D, E-13EG07, E-13EG09, E-13EG15, E-13EG16, E-13EG18, E-13EG18A, E-13EG19, E-13GL06, E-1F9303

5.2.18 Boron Injection Tank Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

As stated in Section 5.2.10, RCP seal injection is available in the event of a fire in area A-21. In addition, the letdown and excess letdown flowpaths can be isolated if a fire occurs in this area. Therefore, boration and inventory control through the BIT is not required to ensure PFSSD.

Damage to cables 14EMG02BA, 14EMG02BB or 14EMG02BC will prevent opening valve EMHV8803B from the control room. Damage to cables 14EMG02DA, 14EMG02DB or 14EMG02DE will prevent opening valve EMHV8801B from the control room.

As stated throughout this report, the Train A CCP is the protected charging pump if a fire occurs in area A-21. BIT inlet valve EMHV8803A and outlet valve EMHV8801A are unaffected by the fire. These valves can be opened using the associated hand switches in the control room. Therefore, boration and inventory control is available using the Train A CCP and injecting through the BIT. However, this may not be necessary due to the availability of RCP seal injection.

References: E-15000, XX-E-013, E-1F9302, E-13EM02A, E-13EM02B, M-12EM02

5.2.19 TDAFP Steam Trap Drain Valve

Valve FCFV0310 is on a 1-inch line downstream of the steam trap. Damage to cables associated with this valve could prevent closing the valve from the control room. Uncontrolled blowdown through this 1-inch line will not cause unacceptable RCS cooldown and will not impact PFSSD.

References: E-15000, XX-E-013, E-1F9202, M-12FC02, E-13FC21

5.2.20 480 VAC Motor Control Center NG02B

A fire in area A-21 could damage the main incoming power cable from load center NG02 to motor control center (MCC) NG02B. If this occurs, power to all Train B PFSSD loads fed by NG02B would be lost. The following table identifies the PFSSD components that could be lost if this occurs and whether a redundant component on the opposite train is available.

480 VAC Motor Control Center NG02B		
MCC Breaker	**Description**	**Redundant Component**
NG02BAF2	Penetration Room Cooler DSGL15B	DSGL15A
NG02BBF1	Power Feed to XPN08A	PG20GER5
NG02BBF3	Valve BBPV8702B	See below
NG02BBR2	Valve EJHV8809B	EJHV8809A
NG02BBR3	Valve EJHV8840	See below
NG02BCF2	Valve BBPV8702A	See below

480 VAC Motor Control Center NG02B		
MCC Breaker	**Description**	**Redundant Component**
NG02BCR1	Valve BGHV8100	BGHV8112
NG02BDF1	Valve BBHV8000B	BBPCV0456A
NG02BDF3	Valve EGHV0062	See below
NG02BDR1	Valve EFHV0032	EFHV0031
NG02BDR2	Valve EFHV0050	EFHV0049
NG02BEF1	Valve EGHV0127	EGHV0058
NG02BEF2	Valve EJHV8811B	See below
NG02BFR1	Relay Panel (EJHV8811B)	See below
NG02BGF3	Valve EPHV8808B	See below
NG02BHF1	Valve EGHV0133	EGHV0061
NG02BHF2	Valve EPHV8808D	See below
NG02BHF3	Valve EFHV0034	EFHV0033
NG02BHR2	Valve EFHV0046	EFHV0045

The power supply to both valves BBPV8702A and BBPV8702B (RCS to RHR pumps A and B) could be disrupted. For hot standby, this is acceptable since the power supply to these valves is normally de-energized at the MCC and the valves are maintained closed. For cold shutdown, however, the valves may not be able to be opened from the control room or from the MCC due to damage to the NG02B incoming power cables. If necessary, a cold shutdown repair could be performed to repair damage to the power supply or a containment entry could be made to open the appropriate valve.

Valve EJHV8840 is normally closed and is required to remain closed for PFSSD. Loss of power to the valve will not have an adverse impact on PFSSD since the valve is normally closed.

Valve EGHV0062 is normally open and will remain open if power is lost. PFSSD requires this valve to be open, or normally closed bypass valve EGHV0132 opened, when using CCW to maintain thermal barrier cooling. Therefore, loss of power to valve EGHV0062 will not adversely impact PFSSD. As discussed in Section 5.2.17, CCW flow to the thermal barrier heat exchangers could be lost, but CCW could be restored quickly from the control room. If CCW is not restored, then it may be necessary to isolate CCW from the thermal barrier to prevent a steam bubble from forming in the CCW piping, which could result in water hammer and damage to the CCW system. Valve EGHV0061 is unaffected by the fire and can be closed from the control room to isolate CCW from the RCP thermal barrier, if necessary.

Valve EJHV8811B is normally closed and is required to remain closed for PFSSD. Loss of power to the valve will maintain it in its closed position. Therefore, loss of power to this valve will have no impact on PFSSD.

NG02BFR1 is a relay panel section that houses relay 3XEJ19 associated with EJHV8811B. Loss of power to this relay will maintain the valve in its normally closed position, which is the desired PFSSD position.

Accumulator tank valves EPHV8808B and EPHV8808D are required to be closed prior to the RCS reaching @ 1,000 psi to prevent accidental accumulator injection. Loss of power to the valves will prevent them from being closed when necessary. The valves are closed when going to cold shutdown, so a cold shutdown repair is allowed. The power cable can either be repaired or nitrogen pressure can be relieved from the tanks to prevent injection.

References: E-15000, XX-E-013, E-13EJ06B, E-13NG01, E-1F9424A, E-1F9424B, E-1F9424D, M-12AL01, M-12BB01, M-12BG01, M-12BG03, M-12EF02, M-12EG03, M-12EM02, M-12EP01

5.2.21 Containment Coolers

Power and control cables associated with Train B containment coolers SGN01B and SGN01D are run through area A-21. Damage to these cables could prevent operation of the coolers. The containment coolers are required to maintain EQ environmental conditions within the containment during normal operations and to reduce the effects of a LOCA.

Train A containment coolers SGN01A and SGN01C are unaffected by the fire. Therefore, containment cooling will be available if a fire occurs in area A-21.

References: E-15000, XX-E-013, E-13GN02A, E-13NG01A, E-1F9441

5.2.22 Control Room Lock-Out Relays

Cables associated with control room lockout relays 86XRP5, 86XRP6 and 86XRP7 are run in area A-21. Equipment controlled by the relays is identified in the table below.

Relay #	Description
86XRP5	Train B MDAFP from CST and ESW Supply Valves (ALHV0034 and ALHV0030)
86XRP6	ESW to TDAFP Supply Valve (ALHV0033)
86XRP7	Train B MDAFP (PAL01B)

Damage to these cables could prevent operation of associated equipment. Train A equipment, located in a separate fire area, is available and is unaffected by the fire.

References: XX-E-013, E-15000, E-13AL01B, E-13AL02B, E-13AL04B, E-13RP12, E-13RP14, E-13RP15, E-093-00095, E-093-00096, E-1F9202, E-1F9204

5.2.23 Auxiliary Shutdown Panel RP118B Process Instruments

Several instrument cables associated with process indication at auxiliary shutdown panel RP118B are run through area A-21. If these instrument cables are damaged, indication at the auxiliary shutdown panel would be lost. A fire in area A-21 does not use the auxiliary shutdown panel to shutdown the plant. Process indication located in the main control room is unaffected.

References: E-15000, XX-E-013, E-13SB16

5.2.24 Containment Sump Isolation Valves

Cable 14EJG06BT, associated with containment sump isolation valve EJHV8811B, is run in this area. Damage to this cable could cause the valve to open, momentarily causing the RWST to drain to the containment sump due to normally open valve BNHV8812B. Cables associated with BNHV8812B are unaffected by a fire in this area.

If valve EJHV8811B fully opens, valve BNHV8812B will automatically close, preventing draindown of the RWST to the containment sump. If valve EJHV8811B spuriously opens but stalls before reaching full open position, valve BNHV8812B will not automatically close. If this occurs, operators will recognize a decreasing RWST level using RWST level indicators BNLI0930, BNLI0932 and BNLI0933 and take action to close BNHV8812B using BNHIS8812B in the main control room.

Based on the above discussion, damage to cables associated with valve EJHV8811B will not adversely impact safe shutdown.

References: E-15000, XX-E-013, E-13EJ06B

5.2.25 Residual Heat Removal System

PFSSD requires one train of residual heat removal (RHR) to be available for shutdown cooling. The RHR system is not used for hot standby.

Valve EGHV0101 is the Train A CCW to RHR Heat Exchanger control valve. Valve EGHV0102 is the Train B CCW to RHR Heat Exchanger control valve. PFSSD requires that the valve on the operating train of CCW be closed until shutdown cooling mode is entered, at which time the valve on the operating train of RHR needs to be open. As stated in Section 5.2.17, the Train B CCW system may not be available to supply cooling water to the Train B RHR heat exchanger.

The Train A CCW system is available to supply cooling water to the Train A RHR heat exchanger. Cables associated with valves EGHV0101 are not run in area A-21. Therefore, the Train A RHR system is available to provide decay heat removal if a fire occurs in area A-21.

References: E-15000, XX-E-013, E-13EG07A

FIRE AREA A-22

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-22 is located on the 2047 elevation of the Auxiliary Building and includes the rooms listed in Table A-22-1.

Table A-22-1
Rooms Located in Fire Area A-22

ROOM #	DESCRIPTION
1512	Train A Control Room A/C Unit

Fire area A-22 has no installed automatic suppression system but is provided with automatic fire detection throughout.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-22-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-22-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-22

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Steam generator A ARV ABPV0001 could spuriously open. If necessary, fail the valve closed by closing valves KAV1435 (air) and KAV1364 (nitrogen) and bleeding air from the regulator.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
AL	Aux. Feedwater System	H, P	Train A MDAFP may not be available. Train B MDAFP is available using either the CST or ESW as the suction source. The TDAFP is available using Train B ESW as the suction source. The suction from the CST and Train A ESW may be affected.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
BB	Reactor Coolant System	R, M, H, P, S	RCP thermal barrier cooling could be affected due to spurious closure of BBHV0013, BBHV0014, BBHV0015 and BBHV0016.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
BN	Borated Refueling Water Storage System	R, M, H	Level transmitters BNLT0930 and BNLT0932 may be affected, causing a spurious low-low level in the RWST. A SIS is not credible if a fire occurs in this area so containment sump isolation valves will not open and the RWST will not drain to the sump.
EF	Essential Service Water System	H, S	The Train A ESW system may be affected due to the potential full opening of EFHV0059 causing a flow imbalance in the system. The Train B ESW system is unaffected by a fire in this area.
EG	Component Cooling Water System	S	The Train A CCW system may be affected. The Train B CCW system is unaffected by a fire in this area. CCW flow to the RCP thermal barriers could be affected as discussed in BB System comments above. CCW flow indicators EGFI0128 and EGFI0129 are unaffected. RCP seal injection remains available throughout the event. Valve EGHV0101 could spuriously open or may not open when operating Train A RHR. Valve EGHV0102 is unaffected.

Table A-22-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-22

System	System Name	PFSSD Function*	Comments
EJ	Residual Heat Removal System	M, H, P	The Train A RHR system may be affected. The Train B RHR system is unaffected by a fire in this area. Containment sump isolation valves EJHV8811A and EJHV8811B could spuriously open, causing a draindown path from the RWST to the containment sump. Valves BNHV8812A and BNHV8812B will automatically close, as designed, when EJHV8811A and EJHV8811B, respectively, reach full open position, mitigating draindown. However, if either EJHV8811A or EJHV8811B stall before reaching full open position, BNHV8812A or BNHV8812B will not automatically close. In this case, operators can close BNHV8812A and BNHV8812B using BNHIS8812A and BNHIS8812B, respectively, in the main control room.
EM	High Pressure Coolant Injection	R, M	All PFSSD functions associated with the High Pressure Coolant Injection System are satisfied. Valves EMHV8801A and EMHV8803A are available to ensure a charging flow path from the Train A CCP to the RCS.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD Support function associated with the Control Room and Class 1E Switchgear Room Coolers is satisfied. Control room A/C unit SGK04B is not affected by a fire in area A-22. Train B Class 1E Switchgear Room Cooler SGK05B is unaffected by a fire in area A-22.
GL	Auxiliary Building HVAC	S	Train A CCW Pump Room Cooler (SGL11A) could be affected. Train B CCW Pump Room Cooler (SGL11B) is unaffected by a fire in this area.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.

Table A-22-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-22

System	System Name	PFSSD Function*	Comments
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
NG	480V Load Centers and MCCs	S	Train A motor control center NG03C could be affected by the fire. Redundant Train B MCCs NG02A, NG02B and NG04C are unaffected by the fire.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.

Table A-22-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-22			
System	**System Name**	**PFSSD Function***	**Comments**
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-22.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-22. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Isolation of SGK04A

A fire could cause spurious operation of SGK04A. If this occurs, operators can isolate power to the unit by opening breaker NG0105 located in fire area C-9 (Room 3301).

3.1.2 Steam Generator Atmospheric Relief Valves

It may be necessary to fail close steam generator ARV ABPV0001 by closing valves KAV1435 (air) and KAV1364 (nitrogen) and bleeding air from the regulator.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Auxiliary Feedwater

It may be necessary to line up AFW using the TDAFP, supplied by Train B ESW or using the Train B MDAFP supplied by either the CST or ESW. Since ARV ABPV0001 may be affected, it may be necessary to use the TDAFP in order to cooldown using at least two steam generators.

3.2.2 Mitigation of RWST Draindown to Containment Sump

If a fire occurs in area A-22, it may be necessary to close valves BNHV8812A and BNHV8812B from the control room using BNHIS8812A and BNHIS8812B, respectively, to mitigate draindown of the RWST into the containment sump. This condition could occur due to EJHV8811A and/or EJHV8811B spuriously opening but stalling before reaching full open position, thereby not providing the permissive for BNHV8812A and BNHV8812B to close. RWST level indication is available using level indicators BNLI0931 and BNLI0933.

3.2.3 Component Cooling Water

Train A CCW could be affected by a fire in this area. If this occurs, swap to Train B CCW using normal operating procedures if Train B CCW is not already running.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

With some exceptions, redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-22.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-22

PFSSD components (S. in E-15000) located in fire area A-22 are shown in Table A-22-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-22-3.

Table A-22-3
PFSSD Equipment Located in Fire Area A-22

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1512	GK198A	Control Room A/C Unit SKG04A Control Panel	5.1.1	
1512	GK198B	Control Room A/C Unit SKG04A Power Panel	5.1.1	
1512	GK198C	Control Room A/C Unit SKG04A Pwr/Ctrl	5.1.1	
1512	GKHZ0029A	Control Room A/C Unit SGK04A Inlet Damper	5.1.1	
1512	GKHZ0029B	Control Room A/C Unit SGK04A Discharge Damper	5.1.1	
1512	NG03C	480V Class 1E Auxiliary Building MCC	5.1.2	
1512	NG03CAF1	Incoming Line from Load Center NG03	5.1.2	
1512	NG03CBF4	RCP C Thermal Barrier Iso Valve (BBHV0015)	5.1.2	
1512	NG03CCF3	ESW to MDAFW Pump A Valve (ALHV0031)	5.1.2	
1512	NG03CCF4	TDAFWP Suction from ESW A Valve (ALHV0032)	5.1.2	
1512	NG03CDF2	CCW Pump Room Cooler Motor (DSGL11A)	5.1.2	
1512	NG03CDF4	RCP A Thermal Barrier Iso Valve (BBHV0013)	5.1.2	
1512	NG03CEF3	CST to MDAFW Pump A Valve (ALHV0032)	5.1.2	
1512	NG03CEF4	TDAFWP Suction from CTS Valve (ALHV0035)	5.1.2	
1512	NG03CGF4	Terminal Board Section	5.1.2	
1512	NG03CHF1	RCP B Thermal Barrier Iso Valve (BBHV0014)	5.1.2	
1512	NG03CHF2	ESW A Return from CCW HX A Iso Vlv (EFHV0059)	5.1.2	
1512	NG03CHF3	CCW A Common Header Return Iso Vlv (EGHV0015)	5.1.2	
1512	NG03CJF1	CCW to RHR HX A Isolation Valve (EGHV0101)	5.1.2	
1512	NG03CJF3	CCW to Nuclear Auxiliary Components (EGHV0053)	5.1.2	
1512	NG03CKF3	CCW Return from Thermal Barrier (EGHV0061)	5.1.2	
1512	NG03CLF1	480VAC Distribution Panel	5.1.2	
1512	NG03CLF2	RCP D Thermal Barrier Iso Valve (BBHV0016)	5.1.2	
1512	NG03CMF1	ESW A to CCW HX A Isolation Valve (EFHV0051)	5.1.2	

Table A-22-3
PFSSD Equipment Located in Fire Area A-22

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1512	NG03CMF4	RHR A to CVCS CCP Isolation Vlv (EJHV8804A)	5.1.2	
1512	SGK04A	Control Room Air Conditioning Unit	5.1.1	
1512	TB15101	TB for Control Room Air Conditioning Unit (SGK04A)	5.1.1	
1512	TB15205	TB for RWST Level Transmitter BNLT0932	5.2.3	

5.1.1 Control Room A/C Unit SGK04A

Train A control room A/C unit SGK04A and associated power and control panels (GK198A, GK198B and GK198C) are located in fire area A-22. In addition, power and control cables associated with this unit are also run in the area. A fire could damage cables and equipment associated with SGK04A, which would prevent operation of the unit or cause the unit to spuriously operate.

Spurious operation of the unit can be mitigated by opening breaker NG0105 located in fire area C-9 (Room 3301).

Control room A/C unit SGK04A inlet and outlet dampers GKHZ0029A and GKHZ0029B and associated control cables are located in the area. Damage to the cables or equipment due to a fire could prevent operation of the dampers, which would prevent operation of SGK04A.

Redundant Train B control room A/C unit SGK04B and associated cables and equipment are located in a different fire area and are separated by minimum 3-hour rated fire barriers. Therefore, there is reasonable assurance that control room ventilation will be available using Train B control room A/C unit SGK04B. Therefore, no E-1F9900 OMA is required to address SGK04A function.

References: E-15000, XX-E-013, E-13GK02A, E-13GK02B, E-13GK02E, E-1F9442, M-12GK01

5.1.2 Train A 480 VAC Motor Control Center NG03C

Motor Control Center (MCC) NG03C is located in area A-22. Several Train A PFSSD components could be affected if the fire damages NG03C and disrupts power to those components.

Redundant Train B equipment, powered by Train B 480 VAC Motor Control Centers NG02A, NG02B and NG04C are located in a separate fire area and are unaffected by the fire.

For further discussion of the cables associated with Train A 480 VAC MCC NG03C that run through area A-22, see Section 5.2.

References: E-15000, XX-E-013, E-1F9424B, E-1F9424C, E-1F9424D

5.2 PFSSD CABLE EVALUATION

Table A-22-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-22. The applicable evaluation section is also listed in Table A-22-4.

Table A-22-4
PFSSD Cables Located in Fire Area A-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ABI20EE	1512	ABPV0001	I	5.2.1	SG A Atmospheric Relief Valve, I/P Device
11ALG02BA	1512	ALHV0035	P	5.2.2	CST to MDAFP A Suction
11ALG02BB	1512	ALHV0035	C	5.2.2	CST to MDAFP A Suction
11ALG02BC	1512	ALHV0035	C	5.2.2	CST to MDAFP A Suction
11ALG02CA	1512	ALHV0036	P	5.2.2	CST to TDAFP Suction
11ALG02CB	1512	ALHV0036	C	5.2.2	CST to TDAFP Suction
11ALG02CC	1512	ALHV0036	C	5.2.2	CST to TDAFP Suction
11ALG04BA	1512	ALHV0031	P	5.2.2	ESW to MDAFP A Suction
11ALG04BB	1512	ALHV0031	C	5.2.2	ESW to MDAFP A Suction
11ALG04BC	1512	ALHV0031	C	5.2.2	ESW to MDAFP A Suction
11ALG04BD	1512	ALHV0031	C	5.2.2	ESW to MDAFP A Suction
11ALG04BE	1512	ALHV0031	C	5.2.2	ESW to MDAFP A Suction
11ALG04CA	1512	ALHV0032	P	5.2.2	ESW to TDAFP Suction (Train A)
11ALG04CB	1512	ALHV0032	C	5.2.2	ESW to TDAFP Suction (Train A)
11ALG04CC	1512	ALHV0032	C	5.2.2	ESW to TDAFP Suction (Train A)
11ALG04CD	1512	ALHV0032	C	5.2.2	ESW to TDAFP Suction (Train A)
11ALG04CE	1512	ALHV0032	C	5.2.2	ESW to TDAFP Suction (Train A)
11BBG03AA	1512	BBHV0013	P	5.2.5	RCP A Thermal Barrier Return Iso Valve
11BBG03AB	1512	BBHV0013	C	5.2.5	RCP A Thermal Barrier Return Iso Valve
11BBG03AC	1512	BBHV0013	C	5.2.5	RCP A Thermal Barrier Return Iso Valve
11BBG03AD	1512	BBHV0013	C	5.2.5	RCP A Thermal Barrier Return Iso Valve
11BBG03BA	1512	BBHV0014	P	5.2.5	RCP B Thermal Barrier Return Iso Valve
11BBG03BB	1512	BBHV0014	C	5.2.5	RCP B Thermal Barrier Return Iso Valve

Table A-22-4
PFSSD Cables Located in Fire Area A-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BBG03BC	1512	BBHV0014	C	5.2.5	RCP B Thermal Barrier Return Iso Valve
11BBG03BD	1512	BBHV0014	C	5.2.5	RCP B Thermal Barrier Return Iso Valve
11BBG03CA	1512	BBHV0015	P	5.2.5	RCP C Thermal Barrier Return Iso Valve
11BBG03CB	1512	BBHV0015	C	5.2.5	RCP C Thermal Barrier Return Iso Valve
11BBG03CC	1512	BBHV0015	C	5.2.5	RCP C Thermal Barrier Return Iso Valve
11BBG03CD	1512	BBHV0015	C	5.2.5	RCP C Thermal Barrier Return Iso Valve
11BBG03DA	1512	BBHV0016	P	5.2.5	RCP D Thermal Barrier Return Iso Valve
11BBG03DB	1512	BBHV0016	C	5.2.5	RCP D Thermal Barrier Return Iso Valve
11BBG03DC	1512	BBHV0016	C	5.2.5	RCP D Thermal Barrier Return Iso Valve
11BBG03DD	1512	BBHV0016	C	5.2.5	RCP D Thermal Barrier Return Iso Valve
11BNI07CA	1512	BNLT0930	I	5.2.3	RWST Level Transmitter
11EFG04AA	1512	EFHV0059	P	5.2.4	Train A CCW Return to ESW UHS
11EFG04AB	1512	EFHV0059	C	5.2.4	Train A CCW Return to ESW UHS
11EFG04AC	1512	EFHV0059	C	5.2.4	Train A CCW Return to ESW UHS
11EFG05AA	1512	EFHV0051	P	5.2.4	ESW A to CCW Heat Exchanger A
11EFG05AB	1512	EFHV0051	C	5.2.4	ESW A to CCW Heat Exchanger A
11EFG05AC	1512	EFHV0051	C	5.2.4	ESW A to CCW Heat Exchanger A
11EGG05AA	1512	EGHV0015	P	5.2.5	CCW A Common Header Return
11EGG05AB	1512	EGHV0015	C	5.2.5	CCW A Common Header Return
11EGG05AC	1512	EGHV0015	C	5.2.5	CCW A Common Header Return
11EGG05CA	1512	EGHV0053	P	5.2.5	CCW Supply to Nuc Aux Comp
11EGG05CB	1512	EGHV0053	C	5.2.5	CCW Supply to Nuc Aux Comp
11EGG05CC	1512	EGHV0053	C	5.2.5	CCW Supply to Nuc Aux Comp

Table A-22-4
PFSSD Cables Located in Fire Area A-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EGG05CD	1512	EGHV0053	C	5.2.5	CCW Supply to Nuc Aux Comp
11EGG07AA	1512	EGHV0101	P	5.2.6	CCW to RHR Heat Exchanger
11EGG07AB	1512	EGHV0101	C	5.2.6	CCW to RHR Heat Exchanger
11EGG07AC	1512	EGHV0101	C	5.2.6	CCW to RHR Heat Exchanger
11EGG09DA	1512	EGHV0061	P	5.2.5	CCW Return from Thermal Barrier
11EGG09DB	1512	EGHV0061	C	5.2.5	CCW Return from Thermal Barrier
11EGG09DC	1512	EGHV0061	C	5.2.5	CCW Return from Thermal Barrier
11EGG09DD	1512	EGHV0061	C	5.2.5	CCW Return from Thermal Barrier
11EGI13AA	1512	EGPT0077	I	5.2.5	CCW Pumps A and C Disch Pressure
11EJG04AA	1512	EJHV8804A	P	5.2.6	RHR Train A Discharge to CCP
11EJG04AB	1512	EJHV8804A	C	5.2.6	RHR Train A Discharge to CCP
11EJG04AC	1512	EJHV8804A	C	5.2.6	RHR Train A Discharge to CCP
11EJG06AT	1512	EJHV8811A	C	5.2.8	CTMT Recirc Sump To RHR Pump A
11GKG02AA	1512	SGK04A	P	5.1.1	Train A Control Room A/C Unit
11GKG02AB	1512	SGK04A	C	5.1.1	Train A Control Room A/C Unit
11GKG02AF	1512	SGK04A	C	5.1.1	Train A Control Room A/C Unit
11GKG02AG	1512	SGK04A	C	5.1.1	Train A Control Room A/C Unit
11GKG02AH	1512	SGK04A	C	5.1.1	Train A Control Room A/C Unit
11GKG02CA	1512	SGK04A	I	5.1.1	Train A Control Room A/C Unit
11GKG02CB	1512	SGK04A	C	5.1.1	Train A Control Room A/C Unit
11GKG02CC	1512	SGK04A	C	5.1.1	Train A Control Room A/C Unit
11GKG02CD	1512	SGK04A	C	5.1.1	Train A Control Room A/C Unit
11GKG02CE	1512	SGK04A	C	5.1.1	Train A Control Room A/C Unit

Table A-22-4
PFSSD Cables Located in Fire Area A-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GKG02CF	1512	SGK04A	C	5.1.1	Train A Control Room A/C Unit
11GKG02CG	1512	SGK04A	C	5.1.1	Train A Control Room A/C Unit
11GKG02CH	1512	SGK04A	P	5.1.1	Train A Control Room A/C Unit
11GKG02CJ	1512	SGK04A	P	5.1.1	Train A Control Room A/C Unit
11GKG02CK	1512	SGK04A	P	5.1.1	Train A Control Room A/C Unit
11GKG02CL	1512	SGK04A	P	5.1.1	Train A Control Room A/C Unit
11GKY02AB	1512	GKHZ0029B	C	5.1.1	SGK04A Supply Damper
11GKY02AC	1512	GKHZ0029A	C	5.1.1	SGK04A Supply Damper
11GKY02AD	1512	GKHZ0029A/B	C	5.1.1	SGK04A Return/Supply Dampers
11GKY02AE	1512	GKHZ0029A/B	C	5.1.1	SGK04A Return/Supply Dampers
11GLG06AA	1512	SGL11A	P	5.2.5	Train A CCW Pumps A and C Room Cooler
11GLG06AC	1512	SGL11A	C	5.2.5	Train A CCW Pumps A and C Room Cooler
11GLG06AD	1512	SGL11A	C	5.2.5	Train A CCW Pumps A and C Room Cooler
11NGG01BB	1512	NG03C	P	5.1.2	Incoming Power Feed to NG03C from NG0306
11NGG01BC	1512	NG03C	P	5.1.2	Incoming Power Feed to NG03C from NG0306
11SAZ19EA	1512	GKHZ0029A/B	C	5.1.1	Status Panel Input
11SAZ19JA	1512	SGK04A	C	5.1.1	Status Panel Input
13BNI07EB	1512	BNLT0932	I	5.2.3	RWST Level Transmitter
13BNI07EC	1512	BNLT0932	I	5.2.3	RWST Level Transmitter
14ABK08DA	1512	ABUY0034B	C	5.2.7	Cooldown Condenser Dump Valve Solenoid
14ABK08EA	1512	ABUY0045B	C	5.2.7	Cooldown Condenser Dump Valve Solenoid
14ABK08FA	1512	ABUY0041B	C	5.2.7	Cooldown Condenser Dump Valve Solenoid
14ABK11AA	1512	ABUY0037B	C	5.2.7	Cooldown Condenser Dump Valve Solenoid

Table A-22-4
PFSSD Cables Located in Fire Area A-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ABK11BA	1512	ABUY0038B	C	5.2.7	Cooldown Condenser Dump Valve Solenoid
14ABK11CA	1512	ABUY0039B	C	5.2.7	Cooldown Condenser Dump Valve Solenoid
14ABK11DA	1512	ABUY0040B	C	5.2.7	Cooldown Condenser Dump Valve Solenoid
14ABK11EA	1512	ABUY0036B	C	5.2.7	Cooldown Condenser Dump Valve Solenoid
14ABK11FA	1512	ABUY0042B	C	5.2.7	Cooldown Condenser Dump Valve Solenoid
14ABK11GA	1512	ABUY0043B	C	5.2.7	Cooldown Condenser Dump Valve Solenoid
14ABK11HA	1512	ABUY0044B	C	5.2.7	Cooldown Condenser Dump Valve Solenoid
14ABK11JA	1512	ABUY0035B	C	5.2.7	Cooldown Condenser Dump Valve Solenoid
14EJG06BT	1512	EJHV8811B	C	5.2.8	CTMT Recirc Sump To RHR Pump B
14EMG02DE	1512	EMHV8801B	C	5.2.8	Train B BIT Outlet Valve

5.2.1 Steam Generator Atmospheric Relief Valves

Cable 11ABI20EE, associated with steam generator atmospheric relief valve (ARV) ABPV0001 runs in area A-22. Cables associated with the remaining ARVs do not run in area A-22.

Damage to cable 11ABI20EE could cause a false signal that would open ABPV0001. If this occurs, operators may not be able to close the valve from the control room. A single failed open ARV is bounded by the main steamline break analysis, so this condition would not impact the ability to safely shut down. Motor driven auxiliary feedwater pump B is available to supply auxiliary feedwater to steam generators A and D. In addition, the turbine driven auxiliary feedwater pump (TDAFP) is available to supply auxiliary feedwater to all four steam generators.

If ABPV0001 spuriously opens, it can be failed closed by isolating the air and nitrogen supplies and bleeding air from the regulator. Air and nitrogen are isolated by closing valves KAV1435 (air) and KAV1364 (nitrogen). These valves are located in fire area A-23 (room 1508) and access is available without having to traverse area A-22. Cooldown can then be accomplished using the TDAFP supplying any two of steam generators B, C or D.

Based on the above discussion, redundant capability exists or manual actions are available to control at least two steam generators and close the remaining two. Therefore, steam generator atmospheric control can be achieved.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB20A, E-1F9101

5.2.2 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

Several cables associated with Train A auxiliary feedwater (AFW) components are run in area A-22. Damage to these cables could impair both suction sources (CST and ESW) to the Train A MDAFP and prevent the CST and Train A ESW from supplying the TDAFP.

Cables associated with Train B AFW components are unaffected by the fire. The Train B CST and ESW source is available to supply the Train B MDAFP. The Train B ESW source is available to supply the TDAFP.

Based on the above discussion, the Train B MDAFP is available to supply AFW to steam generators A and D. However, as stated in Section 5.2.1, steam generator A ARV may have to be failed closed. The TDAFP is available to supply AFW to all four steam generators.

References: E-15000, XX-E-013, E-1F9202, E-1F9204

5.2.3 Refueling Water Storage Tank

The RWST is credited in the PFSSD analysis as the primary source of borated water to achieve cold shutdown. The Wolf Creek Technical Specifications ensure the minimum quantity and boron concentration is maintained to achieve cold shutdown. Therefore, RWST level transmitters, indicators and circuits are not evaluated for level indication.

The RWST level transmitters and associated circuits are included in the PFSSD analysis because of the automatic functions they perform. In particular, a low level in the RWST on 2 out of 4 RWST level transmitters, coincident with a safety injection signal, will initiate a swapover, which is not desired for PFSSD because it could cause the RWST to drain to the containment sump.

Cables associated with refueling water storage tank (RWST) level transmitters BNLT0930 and BNLT0932 are run in fire area A-22. Damage to these cables could initiate a spurious low-low RWST level signal. A spurious SIS is not credible if a fire occurs in area A-22. Therefore, the open permissive will not occur for valves EJHV8811A and EJHV8811B. Consequently, a spurious RWST draindown is not credible if a fire occurs in this area.

Based on the above discussion, the RWST is available if a fire occurs in area A-22.

References: E-15000, XX-E-013, E-13BN07, E-13EJ06A, E-13EJ06B, E-1F9102, E-1F9205, E-1F9302, M-12BN01, M-12EJ01, M-767-00162, M-767-00165, M-767-00168, M-767-00189

5.2.4 Essential Service Water to/from Component Cooling Water Valves

Valve EFHV0051 is the Train A essential service water (ESW) to Train A component cooling water (CCW) heat exchanger supply isolation valve and is required to be open when using Train A for PFSSD. Valve EFHV0059 is the return valve from Train A CCW heat exchanger to the ultimate heat sink (UHS). PFSSD requires that EFHV0059 be closed when using Train A CCW for plant shutdown following a fire and that valve EFV0058 be maintained in a locked throttled position to provide the minimum required ESW water flow. If valve EFHV0059 were to spuriously open when operating Train A ESW, flow imbalance could occur, which will result in flow depletion and inoperability of essential PFSSD components.

Power and control cables associated with EFHV0051 and EFHV0059 run in area A-22. A fire in area A-22 will result in damage to these cables and the inability to control ESW flow to Train A CCW.

Cables associated with Train B ESW to/from CCW valves are run in a different fire area and are unaffected by a fire in area A-22. Therefore, Train B ESW is available to supply the necessary cooling flow to the CCW Train B heat exchanger.

References: E-15000, XX-E-013, E-13EF04, E-13EF05, M-12EF02

5.2.5 Component Cooling Water

For PFSSD, the component cooling water (CCW) system is used to provide cooling to the centrifugal charging pump (CCP) oil cooler, the seal water heat exchanger, the RHR heat exchangers and the RHR pump seal coolers. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Power and control cables associated with Train A CCW valves EGHV0015, EGHV0053 and EGHV0061 run through area A-22. In addition, an instrument cable associated with pressure transmitter EGPT0077 (CCW pumps A and C discharge pressure) runs through area A-22. Damage to these cables due to a fire could prevent operation of the associated equipment and prevent operation of Train A CCW. Cables associated with redundant Train B CCW components are run in a different fire area and are unaffected by the fire.

Power and control cables associated with valves BBHV0013, BBHV0014, BBHV0015 and BBHV0016 could be affected by a fire in this area. Cable damage could cause the valves to spuriously close. If this occurs, CCW flow to the RCP thermal barriers would be lost. In addition, if valve EGHV0061 were to spuriously close, CCW flow to the RCP thermal barriers would be lost. This is acceptable since RCP seal injection remains available to cool the seals.

Loss of thermal barrier cooling would be indicated in the control room as a reduction in flow on flow indicators EGFI0128 and EGFI0129. Therefore, operators can diagnose a loss of thermal barrier cooling.

Cables associated with CCW pump room cooler SGL11A are run in area A-22. Damage to these cables could prevent operation of the cooler. Train B CCW pump room cooler SGL11B is unaffected by the fire and will be available to provide room cooling for the Train B CCW pumps.

Based on the above discussion, Train A CCW could be affected by a fire in this area but Train B CCW is available. CCW flow to the RCP thermal barriers could be affected, but RCP seal injection remains available.

References: E-15000, XX-E-013, E-13BB03, E-13EG05B, E-13EG05C, E-13EG07, E-13EG09A, E-13GL06, E-1F9303, E-1F9401A, E-1F9444

5.2.6 Residual Heat Removal System

PFSSD requires one train of residual heat removal (RHR) to be available for shutdown cooling. The RHR system is not used for hot standby.

Power and control cables associated with valve EJHV8804A are run in area A-22. This valve is required to remain closed for PFSSD when operating the Train A RHR system. Maintaining the valve closed will prevent flow diversion from the RCS to the CVCS.

Valve EGHV0101 is the Train A CCW to RHR Heat Exchanger control valve. Valve EGHV0102 is the Train B CCW to RHR Heat Exchanger control valve. These valves are normally closed during power operation. PFSSD requires that the valve on the operating train of CCW be closed until shutdown cooling mode is entered, at which time the valve on the operating train of RHR needs to be open. As stated in Section 5.2.5, the Train A CCW system may not be available to supply cooling water to the Train A RHR heat exchanger. Cables 11EGG07AA, 11EGG07AB and 11EGG07AC are associated with valve EGHV0101. Damage to the cables could prevent operation of EGHV0101 and damage to cable 11EGG07AC could cause the valve to spuriously open. Valve EGHV0102 is unaffected by a fire in this area.

The Train B CCW system is available to supply cooling water to the Train B RHR heat exchanger. Cables associated with valves EGHV0102 and EJHV8804B are not run in area A-22. Therefore, the Train B RHR system is available to provide decay heat removal if a fire occurs in area A-22.

References: E-15000, XX-E-013, E-13EG07, E-13EJ04A, M-12EJ01

5.2.7 Main Steam Isolation Valve (MSIV) Downstream Components

Control cables for several components downstream of the MSIVs are run in area A-22. These components are required to function (close) in the event the MSIVs cannot be closed due to the fire. A fire in area A-22 will not prevent the closure of the MSIVs or the MSIV bypass valves. Therefore, cable damage to the components downstream of the MSIVs will not adversely impact the ability to achieve and maintain PFSSD.

References: E-15000, XX-E-013, E-13AB08, E-13AB11A, E-13AB11B, E-13AB11C, E-1F9101, E-1F9103

5.2.8 Containment Sump Isolation Valves

Cable 11EJG06AT, associated with containment sump isolation valve EJHV8811A, is run in this area. Damage to this cable could cause the valve to open, momentarily causing the RWST to drain to the containment sump due to normally open valve BNHV8812A. Cables associated with BNHV8812A are unaffected by a fire in this area.

If valve EJHV8811A fully opens, valve BNHV8812A will automatically close, preventing draindown of the RWST to the containment sump. If valve EJHV8811A spuriously opens but stalls before reaching full open position, valve BNHV8812A will not automatically close. If this occurs, operators will recognize a decreasing RWST level using RWST level indicators BNLI0931 and BNLI0933 and take action to close BNHV8812A using BNHIS8812A in the main control room.

Cable 14EJG06BT, associated with containment sump isolation valve EJHV8811B, is run in this area. Damage to this cable could cause the valve to open, momentarily causing the RWST to drain to the containment sump due to normally open valve BNHV8812B. Cables associated with BNHV8812B are unaffected by a fire in this area.

If valve EJHV8811B fully opens, valve BNHV8812B will automatically close, preventing draindown of the RWST to the containment sump. If valve EJHV8811B spuriously opens but stalls before reaching full open position, valve BNHV8812B will not automatically close. If this occurs, operators will recognize a decreasing RWST level using RWST level indicator BNLI0931 and BNLI0933 and take action to close BNHV8812B using BNHIS8812B in the main control room.

Based on the above discussion, damage to cables associated with valves EJHV8811A and EJHV8811B will not adversely impact safe shutdown.

References: E-15000, XX-E-013, E-13EJ06A

5.2.9 Boron Injection Tank (BIT) Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available.

The power and control cables for the RCP seal injection valves (BBHV8351A, BBHV8351B, BBHV8351C and BBHV8351D) are not routed in area A-22 and cannot be damaged by an area A-22 fire. Thus, RCP seal injection will be available in the event of a fire in area A-22. Therefore, boration and inventory control through the BIT is not required to ensure PFSSD.

Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path is the additional RCS charging flowpath.

Damage to cable 14EMG02DE will prevent opening the BIT outlet valve EMHV8801B from the control room. Train A CCP is unaffected if a fire occurs in area A-22. BIT inlet valve EMHV8803A and outlet valve EMHV8801A are also unaffected by the fire. These valves can be opened using the associated hand switches in the control room. Therefore, boration and inventory control is available using the Train A CCP and injecting through the BIT. However, this may not be necessary due to the availability of RCP seal injection.

References: E-15000, XX-E-013, E-1F9302, E-1F9303, E-13BB04, E-13EM02, E-13EM02B, M-12EM02C

FIRE AREA A-23

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-23 is located on the 2026 and 2047 elevation of the Auxiliary Building and includes the rooms listed in Table A-23-1.

Table A-23-1
Rooms Located in Fire Area A-23

ROOM #	DESCRIPTION
1411	Main Feedwater Room No. 1 West
1412	Main Feedwater Room No. 2 East
1508	Main Steam Isolation Valve Room No. 1 West
1509	Main Steam Isolation Valve Room No. 2 East

Rooms 1508 and 1509 have infrared flame detectors installed. There is no automatic fire suppression in fire area A-23. A 2-foot thick barrier separates the east and west compartments within this area. The wall is not fire rated due to the presence of large doorway and vent openings which are necessary for communication between rooms and to prevent over-pressurization of the compartment. The level of protection was found acceptable by the NRC as documented in the Wolf Creek Safety Evaluation Report, Supplement 5, Section 9.5.1.4.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-23-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-23-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-23

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	A fire in the East compartment (Rooms 1412 and 1509) may require ARVs ABPV0002 and ABPV0003 to be failed closed by opening switches NN0208 and NN0307. Cooldown can be controlled using steam generators A and D ARVs ABPV0001 and ABPV0004. A fire in the West compartment (Rooms 1411 and 1508) may require ARVs ABPV0001 and ABPV0004 to be failed closed by opening switches NN0116 and NN0416. Cooldown can be controlled using steam generators B and C ARVs ABPV0002 and ABPV0003. Main steam isolation valves and bypass valves may not be isolable from the control room. Isolation valves located downstream of the MSIVs and bypass valves are unaffected by the fire and can be closed from the control room. Main steamline pressure transmitters ABPT0524, ABPT0525, ABPT0526, ABPT0534, ABPT0535 and ABPT0536 may be affected by a fire in the east compartment and may cause a spurious SI. Steamline pressure indication remains available on steam generators A and D using ABPI0514A, ABPI0515A, ABPI0516A, ABPI0544A, ABPI0545A, and ABPI0546A. Main steamline pressure transmitters ABPT0514, ABPT0515, ABPT0516, ABPT0544, ABPT0545 and ABPT0546 may be affected by a fire in the west compartment and may cause a spurious SI. Steamline pressure indication remains available on steam generators A and D using ABPI0524A, ABPI0525A, ABPI0526A, ABPI0534A, ABPI0535A, and ABPI0536A.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
AE	Main Feedwater	H, P	All four main feedwater isolation valves may not close using either hand switch AEHS0080 or AEHS0081. Main feedwater flow can be stopped from the control room using FCHS0018A, FCHS0018B, FCHS0118A, FCHS0118B and AEHIS0104. All steam generator level indicators on all four steam generators are available.
AL	Aux. Feedwater System	H, P	A fire in the East compartment (Rooms 1412 and 1509) could impact operability of the TDAFP. Both MDAFPs are available following a fire in this area. All three AFW pumps are available if a fire occurs in the West compartment (Rooms 1411 and 1508).
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23. RCS pressure indication is available using BBPI0405 or BBPI0406. Pressurizer level indication is available using BBLI0459A or BBLI0460A.

Table A-23-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-23

System	System Name	PFSSD Function*	Comments
BG	Chemical and Volume Control System	R, M, S	A safety injection signal caused by a sporadic low steamline pressure signal will cause both trains of charging pumps to operate, isolate normal charging and close the VCT outlet valves. This will not adversely impact PFSSD as this is the desired position for these components.
BM	Steam Generator Blowdown System	R, M, H	Blowdown valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 may have to be failed closed by opening breaker NK4411 in room 3404 (fire area C-15).
BN	Borated Refueling Water Storage System	R, M, H	A safety injection signal caused by a sporadic low steamline pressure signal will cause the RWST to align to the charging suction header. This will not adversely impact PFSSD.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
EM	High Pressure Coolant Injection	R, M	A safety injection signal caused by a sporadic low steamline pressure signal will cause the safety injection pumps to operate. This can be mitigated by entering the EMG procedure network and, if necessary, place SI pump control hand switches EMHIS0004 and EMHIS0005 on RL017 in pull-to-lock.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.

Table A-23-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-23

System	System Name	PFSSD Function*	Comments
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23. Containment pressure indicators GNPI0934, GNPI0935, GNPI0936 and GNPI0937 are available.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.

Table A-23-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-23

System	System Name	PFSSD Function*	Comments
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.

Table A-23-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-23			
System	**System Name**	**PFSSD Function***	**Comments**
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-23.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-23. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator Blowdown

If a fire occurs in the east compartment (Rooms 1412/1509), blowdown valves BMHV0002 and BMHV0003 may have to be failed closed by opening breaker NK4411 in room 3404 (fire area C-15). This will also fail BMHV0001 and BMHV0004 closed.

If a fire occurs in the west compartment (Rooms 1411/1508), blowdown valves BMHV0001 and BMHV0004 may have to be failed closed by opening breaker NK4411 in room 3404 (fire area C-15). This will also fail BMHV0002 and BMHV0003 closed.

3.1.2 Steam Generator Atmospheric Relief Valves

If a fire occurs in the east compartment (Rooms 1412 and 1509) isolate steam generators B and C ARVs by opening switches NN0208 and NN0307. These switches are located in rooms 3410 (Area C-15) and 3414 (Area C-16), respectively. Access is available without traversing area A-23 and emergency lighting is provided in the area.

If a fire occurs in the west compartment (Rooms 1411 and 1508) isolate steam generators A and D ARVs by opening switches NN0116 and NN0416. These switches are located in rooms 3408 (Area C-16) and 3404 (Area C-15), respectively. Access is available without traversing area A-23 and emergency lighting is provided in the area.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Main Steam Isolation

MSIVs ABHV0011, ABHV0014, ABHV0017 and ABHV0020 may not close and MSIV bypass valves ABHV0012, ABHV0015, ABHV0018 and ABHV0021 could spuriously open. Operators may need to isolate redundant components located downstream of the MSIVs using hand switches in the main control room.

3.2.2 Safety Injection

A spurious Safety Injection Signal (SIS) due to low steamline pressure can be mitigated by consulting EMG E-0 and terminating the spurious SIS.

3.2.3 Main Feedwater Isolation

All four main feedwater isolation valves may not close using either hand switch AEHS0080 or AEHS0081. Main feedwater flow can be stopped from the control room using FCHS0018A, FCHS0018B, FCHS0118A, FCHS0118B and AEHIS0104.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None specific to PFSSD

4.0 CONCLUSION

With some exceptions, redundant Post Fire Safe Shutdown capability exists if a severe fire occurs in area A-23. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-23.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-23

PFSSD components (S. in E-15000) located in fire area A-23 are shown in Table A-23-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-23-3.

Table A-23-3
PFSSD Equipment Located in Fire Area A-23

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1411	ABPT0514	SG A Steam Pressure	5.1.2	
1411	ABPT0515	SG A Steam Pressure	5.1.2	
1411	ABPT0516	SG A Steam Pressure	5.1.2	
1411	ABPT0544	SG D Steam Pressure	5.1.2	
1411	ABPT0545	SG D Steam Pressure	5.1.2	
1411	ABPT0546	SG D Steam Pressure	5.1.2	
1411	AEFV0039	EBB01A Feedwater Isolation Valve	5.1.4	
1411	AEFV0042	EBB01D Feedwater Isolation Valve	5.1.4	
1411	AEV0421	Steam Generator A Inlet Check Valve	5.1.5	
1411	AEV0422	Steam Generator D Inlet Check Valve	5.1.5	
1411	BMHV0001	SG A Blowdown AFAS Iso	5.1.6	
1411	BMHV0004	SG D Blowdown AFAS Iso	5.1.6	
1411	BMHY0001A	SG A Blowdown AFAS Iso Solenoid Valve	5.1.6	
1411	BMHY0001C	SG A Blowdown AFAS Iso Solenoid Valve	5.1.6	
1411	BMHY0004A	SG D Blowdown AFAS Iso Solenoid Valve	5.1.6	
1411	BMHY0004C	SG D Blowdown AFAS Iso Solenoid Valve	5.1.6	
1411	BMZS0001A	SG A Blowdown AFAS Iso Limit Switch	5.1.6	
1411	BMZS0001B	SG A Blowdown AFAS Iso Limit Switch	5.1.6	
1411	BMZS0004A	SG D Blowdown AFAS Iso Limit Switch	5.1.6	
1411	BMZS0004B	SG D Blowdown AFAS Iso Limit Switch	5.1.6	
1411	TVAE01	Terminal Box For AEFV0039	5.1.4	
1411	TVAE02	Terminal Box For AEFV0039	5.1.4	
1411	TVAE07	Terminal Box For AEFV0042	5.1.4	
1411	TVAE08	Terminal Box For AEFV0042	5.1.4	

Table A-23-3
PFSSD Equipment Located in Fire Area A-23

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1412	ABHV0005	Main Steam Loop 2 To TDAFW Pump	5.1.5	
1412	ABHV0006	Main Steam Loop 3 To TDAFW Pump	5.1.5	
1412	ABHY0005	Main Steam Loop 2 To TDAFW Pump Solenoid Valve	5.1.5	
1412	ABHY0006	Main Steam Loop 3 To TDAFW Pump Solenoid Valve	5.1.5	
1412	ABPT0524	SG B Steam Pressure	5.1.2	
1412	ABPT0525	SG B Steam Pressure	5.1.2	
1412	ABPT0526	SG B Steam Pressure	5.1.2	
1412	ABPT0534	SG C Steam Pressure	5.1.2	
1412	ABPT0535	SG C Steam Pressure	5.1.2	
1412	ABPT0536	SG C Steam Pressure	5.1.2	
1412	AEFV0040	EBB01B Feedwater Isolation Valve	5.1.4	
1412	AEFV0041	EBB01C Feedwater Isolation Valve	5.1.4	
1412	AEV0420	Steam Generator B Inlet Check Valve	5.1.5	
1412	AEV0423	Steam Generator C Inlet Check Valve	5.1.5	
1412	BMHV0002	SG B Blowdown AFAS Iso	5.1.6	
1412	BMHV0003	SG C Blowdown AFAS Iso	5.1.6	
1412	BMHY0002A	SG B Blowdown AFAS Iso Solenoid Valve	5.1.6	
1412	BMHY0002C	SG B Blowdown AFAS Iso Solenoid Valve	5.1.6	
1412	BMHY0003A	SG C Blowdown AFAS Iso Solenoid Valve	5.1.6	
1412	BMHY0003C	SG C Blowdown AFAS Iso Solenoid Valve	5.1.6	
1412	BMZS0002A	SG B Blowdown AFAS Iso Limit Switch	5.1.6	
1412	BMZS0002B	SG B Blowdown AFAS Iso Limit Switch	5.1.6	

Table A-23-3
PFSSD Equipment Located in Fire Area A-23

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1412	BMZS0003A	SG C Blowdown AFAS Iso Limit Switch	5.1.6	
1412	BMZS0003B	SG C Blowdown AFAS Iso Limit Switch	5.1.6	
1412	TVAE03	Terminal Box For AEFV0040	5.1.4	
1412	TVAE04	Terminal Box For AEFV0040	5.1.4	
1412	TVAE05	Terminal Box For AEFV0041	5.1.4	
1412	TVAE06	Terminal Box For AEFV0041	5.1.4	
1508	ABHV0011	Loop 4 Main Steam Isolation Valve	5.1.1	
1508	ABHV0012	Loop 4 MSIV By-Pass	5.1.1	
1508	ABHV0014	Loop 1 Main Steam Isolation Valve	5.1.1	
1508	ABHV0015	Loop 1 MSIV By-Pass	5.1.1	
1508	ABHY0012A	Loop 4 MSIV By-Pass Solenoid Valve	5.1.1	
1508	ABHY0012B	Loop 4 MSIV By-Pass Solenoid Valve	5.1.1	
1508	ABHY0015A	Loop 1 MSIV By-Pass Solenoid Valve	5.1.1	
1508	ABHY0015B	Loop 1 MSIV By-Pass Solenoid Valve	5.1.1	
1508	ABPV0001	SG A Atmospheric Relief Valve	5.1.3	
1508	ABPV0004	SG D Atmospheric Relief Valve	5.1.3	
1508	ABPY0001	SG A Atmospheric Relief Valve I/P Converter	5.1.3	
1508	ABPY0004	SG D Atmospheric Relief Valve I/P Converter	5.1.3	
1508	ABV0018	SG A Atmospheric Relief Valve Iso	5.1.3	
1508	TVAB01	Terminal Box for ABHV14	5.1.1	
1508	TVAB02	Terminal Box for ABHV14	5.1.1	
1508	TVAB07	Terminal Box for ABHV11	5.1.1	
1508	TVAB08	Terminal Box for ABHV11	5.1.1	
1508	KAV1364	ARV ABPV0001 Nitrogen Supply Valve	5.1.3	

Table A-23-3
PFSSD Equipment Located in Fire Area A-23

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1508	KAV1365	ARV ABPV0004 Nitrogen Supply Valve	5.1.3	
1508	KAV1429	ARV ABPV0004 Air Supply Valve	5.1.3	
1508	KAV1435	ARV ABPV0001 Air Supply Valve	5.1.3	
1509	ABFHC0002	SG B Atmospheric Relief Valve Local Controller	5.1.3	
1509	ABFHC0003	SG C Atmospheric Relief Valve Local Controller	5.1.3	
1509	ABHV0017	Loop 2 Main Steam Isolation Valve	5.1.1	
1509	ABHV0018	Loop 2 MSIV By-Pass	5.1.1	
1509	ABHV0020	Loop 3 Main Steam Isolation Valve	5.1.1	
1509	ABHV0021	Loop 3 MSIV By-Pass	5.1.1	
1509	ABHY0018A	Loop 2 MSIV By-Pass Solenoid Valve	5.1.1	
1509	ABHY0018B	Loop 2 MSIV By-Pass Solenoid Valve	5.1.1	
1509	ABHY0021A	Loop 3 MSIV By-Pass Solenoid Valve	5.1.1	
1509	ABHY0021B	Loop 3 MSIV By-Pass Solenoid Valve	5.1.1	
1509	ABPV0002	SG B Atmospheric Relief Valve	5.1.3	
1509	ABPV0003	SG C Atmospheric Relief Valve	5.1.3	
1509	ABPY0002	SG B Atmospheric Relief Valve I/P Converter	5.1.3	
1509	ABPY0003	SG C Atmospheric Relief Valve I/P Converter	5.1.3	
1509	ABV0029	SG C Atmospheric Relief Valve Iso	5.1.3	
1509	TVAB03	Terminal Box for ABHV0017	5.1.1	
1509	TVAB04	Terminal Box for ABHV0017	5.1.1	
1509	TVAB05	Terminal Box for ABHV0020	5.1.1	
1509	TVAB06	Terminal Box for ABHV0020	5.1.1	

Table A-23-3
PFSSD Equipment Located in Fire Area A-23

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1509	KAV1366	ARV ABPV0003 Nitrogen Supply Valve	5.1.3	
1509	KAV1445	ARV ABPV0003 Air Supply Valve	5.1.3	

5.1.1 Steam Generator Main Steam Isolation Valves (MSIVs) and Bypass Valves

PFSSD requires the MSIVs and bypass valves be closed to prevent reactivity addition due to uncontrolled cooldown. The MSIVs and bypass valves are closed from the control room using all close hand switches ABHS0079 or ABHS0080. Alternatively, components located downstream of the MSIVs can be closed to isolate main steam flow. These include the steam dumps, the main steam drain valves, main feed pump turbine valves and others as indicated on E-1F9103.

Each MSIV is designed to utilize system fluid (main steam) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main steam. This is done by actuating either all close hand switch ABHS0079 (separation group 4) or ABHS0080 (separation group 1) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MSIV	ABHS0079 (Sep Group 4)		ABHS0080 (Sep Group 1)	
	Solenoids	Cable	Solenoids	Cable
ABHV0011	MV2, MV4, MV6	14ABK28BH	MV1, MV3, MV5	11ABK29BH
ABHV0014	MV2, MV4, MV6	14ABK29AH	MV1, MV3, MV5	11ABK28AH
ABHV0017	MV2, MV4, MV6	14ABK28AH	MV1, MV3, MV5	11ABK29AH
ABHV0020	MV2, MV4, MV6	14ABK29BH	MV1, MV3, MV5	11ABK28BH

A fire in the east compartment may affect the ability to close MSIVs ABHV0017 and ABHV0020 and may cause MSIV bypass valves ABHV0018 and ABHV0021 to spuriously open. A fire in the west compartment may affect the ability to close MSIVs ABHV0011 and ABHV0014 and may cause MSIV bypass valves ABHV0012 and ABHV0015 to spuriously open. If this occurs, operators will need to isolate redundant components located downstream of the MSIVs using hand switches in the main control room.

Based on the above discussion, a fire in area A-23 could affect the ability to close the MSIVs and bypass valves, due to the valves and circuits located in the area. However, the downstream components are unaffected by the fire and can be closed from the control room.

References: E-15000, XX-E-013, E-13AB23A, E-13AB23B, E-13AB26, E-13AB27, E-13AB28, E-13AB29, E-1F9101, M-12AB02

5.1.2 Safety Injection and Containment Spray

Calculation XX-E-013, Appendix 1 (PFSSD Support Section) provides a detailed discussion about the potential PFSSD impact of a spurious safety injection signal (SIS) and spurious containment spray actuation signal (CSAS). This section discusses the specific PFSSD impact if a fire occurs in this area.

Main steamline pressure transmitters ABPT0524, ABPT0525, ABPT0526, ABPT0534, ABPT0535 and ABPT0536 may be affected by a fire in the east compartment and may cause a spurious SI. Main steamline pressure transmitters ABPT0514, ABPT0515, ABPT0516, ABPT0544, ABPT0545 and ABPT0546 may be affected by a fire in the west compartment and may cause a spurious SI.

A fire in this area will not cause a spurious CSAS.

A spurious SIS starts the charging sequence which starts the CCPs and opens the BIT flowpath valves. For a fire in this area, the BIT flowpath valves are unaffected and would open on a SIS. The RWST valves are unaffected and would open on a SIS. Also, the CCP mini flow valves are unaffected and CCW flow to the seal water heat exchanger is unaffected to ensure cooling of the recirc flow, RCP seal return and CCP oil cooler. Therefore, the charging pumps will not be affected by a spurious SIS caused by a fire in this area.

A start of the CCW system will not adversely impact the system. Both trains of ESW are unaffected and will start on a spurious SIS, providing necessary cooling water to the CCW heat exchangers.

A start of the AFW pumps will not adversely impact PFSSD. All three AFW pumps are unaffected by a fire in the west compartment in this area. Both motor driven AFW pumps are unaffected by a fire in the east compartment in this area. Suction from the CST to the AFW pumps is unaffected. Discharge flow will either return to the CST or flow to the steam generators through the discharge control valves. Therefore, the AFW pumps are unaffected by a spurious SIS caused by a fire in this area.

A start of the RHR pumps due to a spurious SIS will not adversely impact either pump. The RWST supply to the pumps is not affected and the recirculation valves will remain in the open position. Component cooling water is available to both RHR heat exchangers. Operators will have time to terminate the spurious SIS and stop the pumps.

Based on the above discussion, a spurious SIS can occur if a fire occurs in this area. Credited PFSSD equipment will not be damaged by the spurious SIS. Therefore, a spurious SIS will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13AB21, E-1F9431, E-1F9432, M-12AB01

5.1.3 Steam Generator Atmospheric Relief Valves

All four steam generator ARVs are located in this area. Two ARVs are located on the east side of the shield wall and the other two are located on the west side. The PFSSD design requires all four ARVs to be controlled. Damage to the ARVs and associated cables is discussed in the following paragraphs.

For the purpose of this analysis, it is assumed that direct flame impingement on the ARV, in the absence of cable damage, will not cause the valve to spuriously open. The valves require air pressure to open. The current to pneumatic (I/P) converter receives an open signal from the control panel via a 2/c STP #16 AWG instrument cable.

Cables associated with steam generator pressure transmitters ABPT0001, ABPT0002, ABPT0003 and ABPT0004 are not run in area A-23. Therefore, a spurious high pressure signal is not credible. However, instrument cables that run to the I/P converter for each ARV are run in this area. Damage to these cables could cause the associated ARV to open.

Since the air and nitrogen supply valves for all four ARVs, as well as the local control stations for ARVs ABPV0002 and ABPV0003, are located in this area, a spuriously open ARV will need to be mitigated by de-energizing the I/P device. This can be done by opening the associated 120 VAC power supply switch shown in the following table.

ARV	SWITCH	REFERENCE DRAWINGS
ABPV0001	NN0116	J-110-00583, J-110-00584, J-110-00587
ABPV0002	NN0208	J-110-00588, J-110-00590
ABPV0003	NN0307	J-110-00588, J-110-00591
ABPV0004	NN0416	J-110-00592, J-110-00593, J-110-00596

A fire in the West compartment (Rooms 1411 and 1508) may require de-energizing ABPV0001 and ABPV0004. As discussed in Section 5.1.5, all three AFW pumps are available if a fire occurs in these rooms. Opening switches NN0116 and NN0416 will affect the following additional components:

Switch	Affected Components
NN0116	ACPT0233 - Main Steam Ctrl Valve 1 Pressure ALFT0002 - AFW to Steam Generator A Flow Transmitter ALFT0009 - AFW to Steam Generator B Flow Transmitter for ALHV0009 Control ALFT0011 - AFW to Steam Generator C Flow Transmitter for ALHV0011 Control ALHV0006 - TDAFP to SG D Isolation Valve (Valve Fails Open) ALHV0008 - TDAFP to SG A Isolation Valve (Valve Fails Open) ALHV0009 - MDAFP A to SG B Flow Control Valve ALHV0011 - MDAFP A to SG C Flow Control Valve ALLSL0025 - CST Low Level Switch ALPT0025 - MDAFP A Suction Pressure BNTE0002 - RWST Temperature EFFT0053 - ESW A Flow to Powerblock EFPDS0019 - ESW A Self-Cleaning Strainer Pressure Differential Switch EGFT0107 - CCW to Radwaste Building Flow (Train A) EGLV0001 - CCW Surge Tank A Makeup Valve from Demineralized Water EGTSH0031 - CCW A Heat Exchanger Outlet Temperature EJLSH0007 - Containment Recirc Sump A Level GKAE0003 - Control Room Chlorine Monitor GMTC0001 - Diesel Generator A Ventilation Supply Fan GNTE0062 - Containment Cooler C Temperature GTRE0059 - Containment Radiation Monitor JELT0001 - Diesel Generator A Day Tank Level JELT0012 - Diesel Generator A Day Tank Level LFLIT0009 - Containment Normal Sump Level
NN0416	ALFT0007 - AFW to Steam Generator A Flow Transmitter ALHV0005 - MDAFP B to SG D Flow Control Valve ALHV0007 - MDAFP B to SG A Flow Control Valve ALHV0010 - TDAFP to SG B Isolation Valve (Valve Fails Open) ALHV0012 - TDAFP to SG C Isolation Valve (Valve Fails Open) ALLSL0024 - CST Low Level Switch ALPT0024 - MDAFP B Suction Pressure BNTE0005 - RWST Temperature EFFT0054 - ESW B Flow to Powerblock EFPDS0020 - ESW B Self-Cleaning Strainer Pressure Differential Switch EGFT0108 - CCW to Radwaste Building Flow (Train B) EGFT0062 – CCW from RCPs Flow Transmitter EGLV0002 - CCW Surge Tank B Makeup Valve from Demineralized Water EGTE0032 - CCW B Heat Exchanger Outlet Temperature EJLR0006 – Containment Recirc Sump B Level Recorder EJLSH0008 - Containment Recirc Sump B Level GKAE0002 - Control Room Chlorine Monitor GMTC0011 - Diesel Generator B Ventilation Supply Fan GNTE0061 – Containment Cooler B Temperature GTRE0060 - Containment Radiation Monitor JELT0021 - Diesel Generator B Day Tank Level LFLIT0010 - Containment Normal Sump Level

The components listed in the above table will fail to the required PFSSD position or are not required for PFSSD. For a fire in rooms 1411/1508 the TDAFP can be used to supply AFW to steam generators B and C and ARVs ABPV0002 and ABPV0003 can be used to control cooldown.

A fire in the East compartment (Rooms 1412 and 1509) may require de-energizing ABPV0002 and ABPV0003. As discussed in Section 5.1.5, the two MDAFW pumps are available if a fire occurs in this room. Opening switches NN0208 and NN0307 will affect the following additional components:

Switch	Affected Components
NN0208	ACPT0231 - Main Steam Ctrl Valve 3 Pressure ALPT0026 – TDAFP Suction Pressure ALPT0038 – ESFAS Aux Feedwater LSP Initiator NKEY0002 – E/E Converter in Cab RP053DA for NK02 DC Bus Voltage Monitoring NKIY0004 – Battery NK12 E/E Converter for Battery Monitoring
NN0307	ACPT0232 - Main Steam Ctrl Valve 2 Pressure ALFT0004 - AFW to Steam Generator C Flow Transmitter NKEY0003 - E/E Converter in Cab RP053DB for NK03 DC Bus Voltage Monitoring NKIY0006 - Battery NK13 E/E Converter for Battery Monitoring

Loss of the components identified in the above table will have no adverse impact on PFSSD since redundant capability exists. For a fire in rooms 1412/1509 the Train B MDAFP can be used to supply AFW to steam generators A and D and ARVs ABPV0001 and ABPV0004 can be used to control cooldown.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB20A, E-13AB20B, E-1F9101, J-110-00583, J-110-00584, J-110-00587, J-110-00588, J-110-00590, J-110-00591, J-110-00592, J-110-00593, J-110-00596, M-13KA22, M-12KA04, M-12KA05, M-12AB01

5.1.4 Steam Generator Main Feedwater Isolation Valves

PFSSD requires that either the main feedwater isolation valves (MFIVs) be closed or the main feedwater pumps be stopped to prevent overfilling the steam generators. Flow diversion from auxiliary feedwater (AFW) to the main feedwater system piping is prevented by check valves AEV0420, AEV0421, AEV0422 and AEV0423. Closure of the main feedwater isolation valves is not required to prevent AFW flow diversion.

Each MFIV is designed to utilize system fluid (feedwater) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main feedwater. This is done by actuating either all close hand switch AEHS0080 (separation group 1) or AEHS0081 (separation group 4) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MFIV	AEHS0080 (Sep Group 1)		AEHS0081 (Sep Group 4)	
	Solenoids	Cable	Solenoids	Cable
AEFV0039	MV1, MV3, MV5	11AEK16AH	MV2, MV4, MV6	14AEK17AH
AEFV0040	MV1, MV3, MV5	11AEK17AH	MV2, MV4, MV6	14AEK16AH
AEFV0041	MV1, MV3, MV5	11AEK16BH	MV2, MV4, MV6	14AEK17BH
AEFV0042	MV1, MV3, MV5	11AEK17BH	MV2, MV4, MV6	14AEK16BH

All 8 cables associated with the 24 solenoid valves are run in area A-23. However, a shield wall is installed between the two compartments in this room. This shield wall is credited to prevent propagation of hot gases between compartments and provides reasonable assurance that a fire in one compartment will not affect cables or equipment in the other compartment.

Valves AEFV0039 and AEFV0042, and associated cables, are located in the west compartment. Valves AEFV0040 and AEFV0041, and associated cables, are located in the east compartment. Consequently, a fire in this area could prevent closing at least two of the four MFIVs.

As discussed in Section 5.1.1, the MSIVs may not close due to a fire in this area but the downstream MSIV components are unaffected. The steam driven main feedwater pumps and the motor driven feedwater pump can be stopped from the control room.

Based on the above discussion, steam generator overfilling can be prevented by stopping all three main feedwater pumps from the control room.

References: E-15000, XX-E-013, E-13AE16, E-13AE17, E-1F9201, E-1R1353C, E-1R1354, E-1R1914, E-1R1915, M-12AE02

5.1.5 Auxiliary Feedwater

Cables and components associated with Train A and Train B motor driven auxiliary feedwater pumps are not located in area A-23. Therefore, either motor driven auxiliary feedwater pump can be used if a fire occurs in this area.

The main steam supply valves to the turbine driven auxiliary feedwater pump (TDAFP) (ABHV0005 and ABHV0006) are located in the east compartment in this area. Damage to these valves or associated cables could prevent the valves from opening, which would prevent operation of the TDAFP. A fire in the west compartment will not affect these valves, since associated cables are not located in this compartment.

If a fire occurs in the west compartment, all three auxiliary feedwater pumps will be available. If a fire occurs in the east compartment, the two motor driven auxiliary feedwater pumps will be available. Check valves AEV0420, AEV0421, AEV0422 and AEV0423 will ensure AFW flow is directed to the appropriate steam generator.

References: E-15000, XX-E-013, E-13AB01, E-13AB01A, E-1F9101, E-1F9202, M-12AB02, M-12AE02

5.1.6 Steam Generator Blowdown to Blowdown Flash Tank Valves

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown. The air operated valves are normally open and each valve is controlled by three solenoid valves. All three solenoid valves are required to be energized to open the valve. If any one solenoid is de-energized, the associated valve will close or remain closed. Only two of the three solenoids for each valve are considered in the PFSSD analysis, so the third solenoid is assumed energized throughout the event.

All four valves and associated cables are located in area A-23. Valves BMHV0001 and BMHV0004 are located in the west compartment while BMHV0002 and BMHV0003 are located in the east compartment. Cables associated with each valve are located in the same compartment as the valve, so a fire in one compartment will not affect the valves in the other compartment.

The control room handswitch (BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A) associated with each valve is unaffected by a fire in this area. When the close button on the handswitch is depressed, the associated solenoid is de-energized and the valve will close. However, an external (inter-cable) +125 VDC hot short could cause the affected valves to open. The cables are run in raceway carrying the proper voltage such that a single +125 VDC inter-cable hot short is postulated to occur.

In the unlikely event that cable damage described above occurs, the blowdown valves can be failed closed by opening breaker NK4411 in room 3404 (fire area C-15). Access to this room is available without having to pass through area A-23 and emergency lighting is available.

Thermal hydraulic analysis WCNOC-CP-002 shows insignificant impact on SG inventory even with all four blowdown valves open. Therefore, no E-1F9900 OMA is required to close blowdown valves to achieve and maintain hot standby. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 34.

References: E-15000, XX-E-013, E-13BM06A, E-13BM06C, E-13BM06D, E-13RL07, E-1F9101, M-12BM01

5.2 PFSSD CABLE EVALUATION

Table A-23-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-23. The applicable evaluation section is also listed in Table A-23-4. Since all cables in this area terminate at their associated component, there are no evaluations in Section 5.2. All cable evaluations are documented in Section 5.1, along with their associated component.

Table A-23-4
PFSSD Cables Located in Fire Area A-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ABI20EE	1508	ABPV0001	I	5.1.3	SG A ARV I/P Converter (ABPY0001)
11ABI21JA	1411	ABPT0514	I	5.1.2	SG A Steam Pressure
11ABI21MA	1412	ABPT0524	I	5.1.2	SG B Steam Pressure
11ABI21RA	1412	ABPT0534	I	5.1.2	SG C Steam Pressure
11ABI21UA	1411	ABPT0544	I	5.1.2	SG D Steam Pressure
11ABK23AA	1411, 1508	ABHY0012A	C	5.1.1	Loop 4 MSIV By-Pass Solenoid Valve
11ABK23AB	1411, 1508	ABHY0015A	C	5.1.1	Loop 1 MSIV By-Pass Solenoid Valve
11ABK23AC	1412, 1509	ABHY0018A	C	5.1.1	Loop 2 MSIV By-Pass Solenoid Valve
11ABK23AD	1412, 1509	ABHY0021A	C	5.1.1	Loop 3 MSIV By-Pass Solenoid Valve
11ABK28AH	1411, 1508	ABHV0014	C	5.1.1	Loop 1 Main Steam Isolation Valve
11ABK28BH	1412, 1509	ABHV0020	C	5.1.1	Loop 3 Main Steam Isolation Valve
11ABK29AH	1412, 1509	ABHV0017	C	5.1.1	Loop 2 Main Steam Isolation Valve
11ABK29BH	1411, 1508	ABHV0011	C	5.1.1	Loop 4 Main Steam Isolation Valve
11AEK16AH	1411, 1508	AEFV0039	C	5.1.4	EBB01A Feedwater Isolation Valve
11AEK16BH	1412	AEFV0041	C	5.1.4	EBB01C Feedwater Isolation Valve
11AEK17AH	1412	AEFV0040	C	5.1.4	EBB01B Feedwater Isolation Valve
11AEK17BH	1411, 1508	AEFV0042	C	5.1.4	EBB01D Feedwater Isolation Valve
11BMK06EA	1411, 1508	BMHV0001	C	5.1.6	SG A Blowdown AFAS Iso Limit Switch
11BMK06FA	1412	BMHV0002	C	5.1.6	SG B Blowdown AFAS Iso Limit Switch
11BMK06GA	1412	BMHV0003	C	5.1.6	SG C Blowdown AFAS Iso Limit Switch
11BMK06HA	1411, 1508	BMHV0004	C	5.1.6	SG D Blowdown AFAS Iso Limit Switch
12ABI20FE	1412, 1509	ABPV0002	I	5.1.3	SG B ARV I/P Converter (ABPY0002)

Table A-23-4
PFSSD Cables Located in Fire Area A-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12ABI21KA	1411	ABPT0515	I	5.1.2	SG A Steam Pressure
12ABI21NA	1412	ABPT0525	I	5.1.2	SG B Steam Pressure
12ABI21SA	1412	ABPT0535	I	5.1.2	SG C Steam Pressure
12ABI21VA	1411	ABPT0545	I	5.1.2	SG D Steam Pressure
12ABK01AF	1412	ABHV0005	C	5.1.5	Main Steam Loop 2 To TDAFW Pump
12ABK01BF	1412	ABHV0006	C	5.1.5	Main Steam Loop 3 To TDAFW Pump
12SAZ23AA	1412	ABHV0005	C	5.1.5	Main Steam Loop 2 To TDAFW Pump
12SAZ23BA	1412	ABHV0006	C	5.1.5	Main Steam Loop 3 To TDAFW Pump
13ABI20GE	1412, 1509	ABPV0003	I	5.1.3	SG C ARV I/P Converter (ABPY0003)
13ABI21PA	1412	ABPT0526	I	5.1.2	SG B Steam Pressure
13ABI21TA	1412	ABPT0536	I	5.1.2	SG C Steam Pressure
14ABI20HE	1411, 1508	ABPV0004	I	5.1.3	SG D ARV I/P Converter (ABPY0004)
14ABI21LA	1411	ABPT0516	I	5.1.2	SG A Steam Pressure
14ABI21WA	1411	ABPT0546	I	5.1.2	SG D Steam Pressure
14ABK23FA	1411, 1508	ABHY0012B	C	5.1.1	Loop 4 MSIV By-Pass Solenoid Valve
14ABK23FB	1411, 1508	ABHY0015B	C	5.1.1	Loop 1 MSIV By-Pass Solenoid Valve
14ABK23FC	1412, 1509	ABHY0018B	C	5.1.1	Loop 2 MSIV By-Pass Solenoid Valve
14ABK23FD	1412, 1509	ABHY0021B	C	5.1.1	Loop 3 MSIV By-Pass Solenoid Valve
14ABK28AH	1412, 1509	ABHV0017	C	5.1.1	Loop 2 Main Steam Isolation Valve
14ABK28BH	1411, 1508	ABHV0011	C	5.1.1	Loop 4 Main Steam Isolation Valve
14ABK29AH	1411, 1508	ABHV0014	C	5.1.1	Loop 1 Main Steam Isolation Valve
14ABK29BH	1412, 1509	ABHV0020	C	5.1.1	Loop 3 Main Steam Isolation Valve

Table A-23-4
PFSSD Cables Located in Fire Area A-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14AEK16AH	1412	AEFV0040	C	5.1.4	EBB01B Feedwater Isolation Valve
14AEK16BH	1411, 1508	AEFV0042	C	5.1.4	EBB01D Feedwater Isolation Valve
14AEK17AH	1411, 1508	AEFV0039	C	5.1.4	EBB01A Feedwater Isolation Valve
14AEK17BH	1412	AEFV0041	C	5.1.4	EBB01C Feedwater Isolation Valve
14BMK06AA	1411, 1508	BMHV0001	C	5.1.6	SG A Blowdown AFAS Iso
14BMK06BA	1412	BMHV0002	C	5.1.6	SG B Blowdown AFAS Iso
14BMK06CA	1412	BMHV0003	C	5.1.6	SG C Blowdown AFAS Iso
14BMK06DA	1411, 1508	BMHV0004	C	5.1.6	SG D Blowdown AFAS Iso
15BMK06AA	1411	BMHV0001	C	5.1.6	SG A Blowdown AFAS Iso
15BMK06BA	1412	BMHV0002	C	5.1.6	SG B Blowdown AFAS Iso
15BMK06CA	1412	BMHV0003	C	5.1.6	SG C Blowdown AFAS Iso
15BMK06DA	1411	BMHV0004	C	5.1.6	SG D Blowdown AFAS Iso

FIRE AREA A-24

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-24 is located on the 2000 elevation of the Auxiliary Building and includes the rooms listed in Table A-24-1.

Table A-24-1
Rooms Located in Fire Area A-24

ROOM #	DESCRIPTION
1323	North Pipe Penetration Room
N/A	Duct chase from 2000 elevation to 2026 elevation

Fire area A-24 has automatic fire detection installed throughout, except within the duct chase. There is no automatic fire suppression installed. The area is separated from other areas by minimum 3-hour fire rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-24-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-24-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-24

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	ARV ABPV0003 may need to be isolated using local controller ABFHC0003 in area A-23. Main steam to TDAFP valves ABHV0005 and ABHV0006 may be affected.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
AL	Aux. Feedwater System	H, P	The turbine auxiliary feedwater pump is affected. Train B auxiliary feedwater pump PAL01B is available to supply auxiliary feedwater to steam generators A and D but cable damage could cause valves ALHV0005 and ALHV0007 to fail full open. Train A auxiliary feedwater pump PAL01A is available to supply auxiliary feedwater to steam generators B and C, but ARV ABPV0003 may need to be locally controlled.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
BG	Chemical and Volume Control System	R, M, S	Valves BGHV8105 and BGHV8106 may be affected and may not respond to a close signal from the control room. Operators can mitigate this by maintaining the auxiliary pressurizer spray valve (BGHV8145) closed, tripping the RCPs and cycling the charging pump as needed to maintain pressurizer level.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
EF	Essential Service Water System	H, S	Valves EFHV0031 and EFHV0049 associated with Train A ESW to/from the Train A containment coolers may be affected. Valves associated with Train B containment coolers are located in a separate fire area and are unaffected by a fire in this area.
EG	Component Cooling Water System	S	Valves EGHV0058, EGHV0061, EGHV0071, EGHV0126, EGHV0127 and EGHV0133 in the CCW to/from RCP auxiliaries flowpath may be affected. The damage would not result in the valves spuriously operating but could prevent operation from the control room. Valves EGHV0062 and EGHV0132 are unaffected.
EJ	Residual Heat Removal System	M, H, P	Cables associated with EJHV8809A are located in this area but damage will not result in the valve spuriously closing. Both trains of RHR are available if a fire occurs in this area.

Table A-24-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-24

System	System Name	PFSSD Function*	Comments
EM	High Pressure Coolant Injection	R, M	Boron injection tank (BIT) outlet isolation valves EMHV8801A and EMHV8801B could be affected. Reactor coolant pump seal injection is available for boration and inventory control. For transition to cold shutdown, one of these valves may need to be manually opened to provide additional makeup using Train B CCP.
EN	Containment Spray	R, M	Train A containment spray isolation valve ENHV0006 could spuriously open. A spurious CSAS is not credible for a fire in this area and the Train A containment spray pump will not spuriously start. Therefore, spurious opening of ENHV0006 will not result in an actual containment spray.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
FC	Auxiliary Turbines	R, H, P	The TDAFP mechanical trip and throttle valve FCHV0312 and the speed governing valve FCFV0313 may be affected. The Train A motor driven auxiliary feedwater pump is available.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.

Table A-24-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-24

System	System Name	PFSSD Function*	Comments
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.

Table A-24-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-24			
System	**System Name**	**PFSSD Function***	**Comments**
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
SA	ESFAS	S	The status panel (SA066C) input for valves ABHV0005 and ABHV0006, associated with the TDAFP, could be affected. This is acceptable since the TDAFP is affected by a fire in area A-24.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-24.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-24. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator Atmospheric Relief Valves

ARV ABPV0003 may need to be controlled using local controller ABFHC0003 in area A-23. Emergency lighting is available and access is available without having to traverse area A-24.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Charging

Valves BGHV8105 and BGHV8106 may be affected and may not respond to a close signal from the control room. Operators can mitigate this by maintaining the auxiliary pressurizer spray valve (BGHV8145) closed, tripping the RCPs and cycling the charging pump as needed to maintain pressurizer level.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 Boron Injection Tank Flowpath

It may be necessary to manually open either EMHV8801A or EMHV8801B in order to establish a BIT flowpath.

3.3.2 CCW to Excess Letdown Flowpath

It may be necessary to manually open EGHV0059 to establish a flowpath from CCW to the excess letdown heat exchanger.

4.0 CONCLUSION

With some exceptions, redundant Post Fire Safe Shutdown capability exists if a severe fire occurs in area A-24. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-24.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-24

PFSSD components (S. in E-15000) located in fire area A-24 are shown in Table A-24-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-24-3.

Table A-24-3
PFSSD Equipment Located in Fire Area A-24

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1323	BGHV8105	Charging Pumps To Regenerative HX/CTMT Iso Valve	5.1.1	
1323	BGHV8106	Charging Pumps To Regenerative HX Iso Valve	5.1.1	
1323	EFHV0031	ESW A To CTMT Air Coolers Outside CTMT Iso Valve	5.1.2	
1323	EFHV0049	ESW A From CTMT Air Coolers Outside CTMT Iso Valve	5.1.2	
1323	EGHV0126	CCW HX Out to RCS Bypass Isolation Valve	5.1.3	
1323	EGHV0127	CCW HX Out to RCS Bypass Isolation Valve	5.1.3	
1323	EGHV0133	Thermal Barrier CCW Return to RCS Bypass Iso Valve	5.1.3	
1323	EGHV0058	CCW HX Out to RCS CTMT Iso Valve	5.1.3	
1323	EGHV0059	CCW Return From RCS Iso Valve	5.1.6	
1323	EGHV0061	CCW Return From RCS Iso Valve	5.1.3	
1323	EGHV0071	CCW HX Out to RCS CTMT Iso Valve	5.1.3	
1323	EJHV8809A	RHR To Accum Injection Loops 1 & 2 Iso Valve	5.1.4	
1323	EMHV8801A	BIT Outlet Iso Valve to RCS	5.1.5	
1323	EMHV8801B	BIT Outlet Iso Valve to RCS	5.1.5	
1323	EMHV8964	SI Test Line System Outside CTMT Iso Valve	5.1.5	
1323	EMHY8964	SI Test Line/Containment Iso Valve Solenoid	5.1.5	
1323	ENHV0006	Containment Spray Pump A Disch Iso Valve	5.2.2	

5.1.1 Charging to Regen Heat Exchanger Isolation Valves

The Post Fire Safe Shutdown methodology requires isolation of charging flow to the regenerative heat exchanger. Two motor operated valves (BGHV8105 and BGHV8106) and one manual valve (BG8402B) installed on the discharge line are credited in the PFSSD analysis to ensure the charging flowpath can be isolated.

Valves BGHV8105 and BGHV8106, and associated power and control cables, are located in area A-24. Damage to these cables and valves could prevent closing the valves from the control room.

Calculation WCNOC-CP-002 Scenario 5.3 documents the thermal hydraulic plant response where the normal charging pump continues to operate, the charging flow control valve goes full open and the normal charging line cannot be isolated. Based on the calculation, PFSSD can be achieved by maintaining the auxiliary pressurizer spray valve (BGHV8145) closed, tripping the RCPs and cycling the charging pump as needed to maintain pressurizer level.

Cables for the normal charging pump (PBG04) and both centrifugal charging pumps (PBG05A and PBG05B) are unaffected by a fire in this area. Therefore, the pumps can be controlled from the control room.

Cables for BGHV8145 are unaffected by a fire in this area. Therefore, the auxiliary spray valve will not spuriously open if a fire occurs in this area or, if the valve is open, it can be closed from the control room.

Cables associated with the reactor coolant pumps are unaffected by a fire in this area. Therefore, the RCPs can be tripped from the control room if a fire occurs in this area.

The NCP and valve BGHV8145 are not PFSSD components and the cables for these components are not PFSSD. However, a Setroute review was performed and it was determined that the cables are not located in fire area A-24. Cables that were reviewed are as follows.

Cable	Component	Function	Routing
15BGK37AA	DPBG04	Control Cable for the NCP	TURBINE, CC-1, C-21
15PBK12AA	DPBG04	Control Power	TURBINE
15PBK12AB	DPBG04	Control Power	TURBINE
15BGK19AA	BGHV8145	Control Cable	A-1, A-11, A-18, C-7, C-12, C-18, C-21, C-24, C-27
15BGK19AB	BGHV8145	Control Cable	RB

Based on the above discussion and Calculation WCNOC-CP-002, PFSSD can be achieved if the fire prevents isolation of normal charging.

References: XX-E-013, E-15000, E-13BG11A, E-13BG19, E-13BG37, E-13BG44, E-13PB12, E-1F9102, E-1F9302, M-12BG03, Calculation WCNOC-CP-002

5.1.2 Containment Cooling

At least one train of containment cooling is required for PFSSD to maintain the containment atmosphere within EQ limits.

Valves EFHV0031 and EFHV0049, and associated power and control cables, are located in area A-24. These valves are in the flowpath from Train A ESW to/from the Train A containment coolers. Damage to these valves and cables could cause the valves to spuriously close, isolating ESW to the train A containment coolers.

Valves associated with Train B containment coolers are located in a separate fire area and are unaffected by a fire in this area. Therefore, Train B containment coolers are available to maintain the containment atmosphere if a fire occurs in this area.

References: XX-E-013, E-15000, E-13EF07, E-13EF08, E-1F9403, M-12EF02

5.1.3 Thermal Barrier Cooling

The Wolf Creek plant design provides two redundant methods of cooling the RCP seals, thermal barrier cooling using CCW and seal injection using the CCP. The PFSSD methodology at Wolf Creek requires tripping the RCPs and performing a natural circulation cooldown upon loss of both thermal barrier cooling (TBC) and seal injection. If only one method is lost, continued operation of the RCP is allowed by present established procedures until the other method can be re-established.

Valves EGHV0058, EGHV0061 and EGHV0071 are normally open valves in the flowpath from CCW to/from the RCP thermal barriers. These valves, as well as associated power and control cables, are located in this fire area. Damage to the cables would result in the valves remaining in the open position and would prevent closure of the valves from the control room. The cable damage would not cause the valves to spuriously close.

Valves EGHV0126, EGHV0127 and EGHV0133 are normally closed bypass valves in the flowpath from CCW to/from the RCP thermal barriers. These valves, as well as associated power and control cables, are located in this fire area. Damage to the cables would result in the valves remaining in the closed position and would prevent opening of the valves from the control room.

Based on the above discussion, CCW flow to the RCP thermal barriers is unaffected by a fire in this area.

References: E-15000, XX-E-013, E-13EG09, E-13EG09A, E-13EG10, E-13EG17A, E-13EG18, E-13EG18A, M-12EG03, E-1F9303

5.1.4 Residual Heat Removal

For cold shutdown, the RHR pump discharge to RCS cold leg isolation valve (EJHV8809A or EJHV8809B) needs to be open on the operating train. Valve EJHV8809A, and associated cables, are located in area A-24.

Damage to cables 11EJG09CA and 11EJG09CB will result in valve EJHV8809A remaining in its as-is normally open position, which is the preferred PFSSD position. There is no postulated cable failures that would cause the valve to close. Cables associated with Train B valve EJHV8809B do not run in area A-24. Therefore, both Trains A and B RHR pump discharge to RCS cold leg flow paths are available for a fire in area A-24.

References: E-15000, XX-E-013, E-13EJ09A, E-1F9205, M-12EJ01

5.1.5 Boron Injection Tank Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

BIT outlet valves EMHV8801A and EMHV8801B, and associated cables, are located in this fire area. Damage to the valves and cables due to a fire could prevent opening the valves from the control room. For hot standby, RCP seal injection is available for boration and inventory control. When transitioning to cold shutdown, it may be necessary to locally open either EMHV8801A or EMHV8801B to establish additional RCS makeup.

Valve EMHV8964 and associated cables are located in this area. Either this valve or valve EMHV8871 is required to be closed when charging through the BIT to prevent flow diversion through the SI test line. Cables for valve EMHV8871 do not run in this area and the valve will remain closed throughout the event. Therefore, if EMHV8964 spuriously opens, it will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13EM02, E-13EM02A, E-13EM12, E-1F9302, M-12EM01, M-12EM02

5.1.6 CCW From RCP Containment Isolation Valve

Valve EGHV0059 is included in the PFSSD equipment list to ensure availability of CCW to the excess letdown heat exchanger during cold shutdown. For hot standby, the position of this valve (open or closed) will not impact PFSSD. Since this valve is only credited for cold shutdown, cables associated with the valve are not considered in the PFSSD analysis. If the valve is required for cold shutdown, it can be repaired, if necessary, and manually opened. Based on the above discussion, a fire in this area that affects EGHV0059 will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13EG09, M-12EG03

5.2 PFSSD CABLE EVALUATION

Table A-24-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-24. The applicable evaluation section is also listed in Table A-24-4.

Table A-24-4
PFSSD Cables Located in Fire Area A-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BGG11BA	1323	BGHV8106	P	5.1.1	Charging Pumps to Regenerative HX Iso
11BGG11BB	1323	BGHV8106	C	5.1.1	Charging Pumps to Regenerative HX Iso
11EFG07AA	1323	EFHV0031	P	5.1.2	Train A ESW to Ctmt Air Coolers
11EFG07AB	1323	EFHV0031	C	5.1.2	Train A ESW to Ctmt Air Coolers
11EFG08AA	1323	EFHV0049	P	5.1.2	Train A ESW from Ctmt Air Coolers
11EFG08AB	1323	EFHV0049	C	5.1.2	Train A ESW from Ctmt Air Coolers
11EGG09AA	1323	EGHV0058	P	5.1.3	CCW HX Out to RCS CTMT Iso Valve
11EGG09AB	1323	EGHV0058	C	5.1.3	CCW HX Out to RCS CTMT Iso Valve
11EGG09DA	1323	EGHV0061	P	5.1.3	CCW Return From RCS Iso Valve
11EGG09DB	1323	EGHV0061	C	5.1.3	CCW Return From RCS Iso Valve
11EGG18AA	1323	EGHV0126	P	5.1.3	CCW HX Out to RCS Bypass Isolation Valve
11EGG18AB	1323	EGHV0126	C	5.1.3	CCW HX Out to RCS Bypass Isolation Valve
11EJG09CA	1323	EJHV8809A	P	5.1.4	RHR to Accum Inj Loops 1 & 2 Iso Valve
11EJG09CB	1323	EJHV8809A	C	5.1.4	RHR to Accum Inj Loops 1 & 2 Iso Valve
11EMG02CA	1323	EMHV8801A	P	5.1.5	BIT Outlet Iso Valve to RCS
11EMG02CB	1323	EMHV8801A	C	5.1.5	BIT Outlet Iso Valve to RCS
11EMK12BA	1323	EMHV8964	C	5.1.5	SI Test Line System Outside CTMT Iso Valve
11ENG03AA	1323	ENHV0006	P	5.2.2	Train A Containment Spray Isolation Valve
11ENG03AB	1323	ENHV0006	C	5.2.2	Train A Containment Spray Isolation Valve
12ABI20FE	1323	ABPV0002	I	5.2.1	SG B ARV I/P Converter (ABPY0002)
12ABI20FH	1323	ABPV0002	I	5.2.1	SG B Steamline Pressure (ABPT0002)
12ABI21KA	1323	ABPT0515	I	5.2.2	SG A Steam Pressure Transmitter
12ABI21NA	1323	ABPT0525	I	5.2.2	SG B Steam Pressure Transmitter

Table A-24-4
PFSSD Cables Located in Fire Area A-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12ABI21SA	1323	ABPT0535	I	5.2.2	SG C Steam Pressure Transmitter
12ABI21VA	1323	ABPT0545	I	5.2.2	SG D Steam Pressure Transmitter
12ABK01AF	1323	ABHV0005	C	5.2.3	Main Steam Loop 2 to TDAFW Pump
12ABK01BF	1323	ABHV0006	C	5.2.3	Main Steam Loop 3 to TDAFW Pump
12ALI07KD	1323	ALPT0026	I	5.2.3	Turbine AUX Feedwater Pump SUCT
12ALI08BA	1323	ALPT0038	I	5.2.3	ESFAS AFW Low Suction Pressure Transmitter
12FCK23AD	1323	FCHV0312	C	5.2.3	TDAFP Mechanical Trip/Throttle Valve
12FCK23AR	1323	FCHV0312	P	5.2.3	TDAFP Mechanical Trip/Throttle Valve
12FCK23AS	1323	FCHV0312	C	5.2.3	TDAFP Mechanical Trip/Throttle Valve
12FCK24AA	1323	FCFV0313	C	5.2.3	TDAFP Speed Governing Valve
12FCK24AK	1323	FCFV0313	I	5.2.3	TDAFP Speed Governing Valve
12SAZ23AA	1323	ABHV0005	C	5.2.3	Main Steam Loop 2 to TDAFW Pump
12SAZ23BA	1323	ABHV0006	C	5.2.3	Main Steam Loop 3 to TDAFW Pump
13ABI20GA	1323	ABPV0003	I	5.2.1	SG C Steamline Pressure (ABPT0003)
13ABI20GE	1323	ABPV0003	I	5.2.1	SG C ARV I/P Converter (ABPY0003)
13ABI21PA	1323	ABPT0526	I	5.2.2	SG B Steam Pressure Transmitter
13ABI21TA	1323	ABPT0536	I	5.2.2	SG C Steam Pressure Transmitter
14ABI20HH	1323	ABPV0004	I	5.2.1	SG D Steamline Pressure (ABPT0004)
14ABI21LA	1323	ABPT0516	I	5.2.2	SG A Steam Pressure Transmitter
14ABI21WA	1323	ABPT0546	I	5.2.2	SG D Steam Pressure Transmitter
14ALI03AJ	1323	ALHV0005	I	5.2.3	MDAFP B to SG D
14ALI03AK	1323	ALHV0005	I	5.2.3	MDAFP B to SG D
14ALI03AL	1323	ALHV0005	I	5.2.3	MDAFP B to SG D

Table A-24-4
PFSSD Cables Located in Fire Area A-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALI03BD	1323	ALHV0007	I	5.2.3	MDAFP B to SG A
14ALI03BE	1323	ALHV0007	I	5.2.3	MDAFP B to SG A
14ALI03BF	1323	ALHV0007	I	5.2.3	MDAFP B to SG A
14ALI05AG	1323	ALHV0010	I	5.2.3	TDAFP to SG B
14ALI05AH	1323	ALHV0010	I	5.2.3	TDAFP to SG B
14ALI05AJ	1323	ALHV0010	I	5.2.3	TDAFP to SG B
14ALI05BD	1323	ALHV0012	I	5.2.3	TDAFP to SG C
14ALI05BE	1323	ALHV0012	I	5.2.3	TDAFP to SG C
14ALI05BF	1323	ALHV0012	I	5.2.3	TDAFP to SG C
14ALI07AD	1323	ALFT0001	I	5.2.3	Auxiliary Feedwater Flow to SG D
14ALI07HD	1323	ALPT0024	I	5.2.3	MDAFP B Suction Pressure
14ALI08CA	1323	ALPT0039	I	5.2.3	ESFAS AFW Low Suction Pressure Transmitter
14ALI09AA	1323	ALFT0007	I	5.2.3	Auxiliary Feedwater Flow to SG A
14ALY09AB	1323	ALHV0005	P	5.2.3	MDAFP B to SG D
14ALY09BB	1323	ALHV0007	P	5.2.3	MDAFP B to SG A
14BGG11AA	1323	BGHV8105	P	5.1.1	Charging Pumps to REGEN HX/CTMT Iso
14BGG11AB	1323	BGHV8105	C	5.1.1	Charging Pumps to REGEN HX/CTMT Iso
14EGG09CA	1323	EGHV0071	P	5.1.3	CCW HX Out to RCS CTMT Iso Valve
14EGG09CB	1323	EGHV0071	C	5.1.3	CCW HX Out to RCS CTMT Iso Valve
14EGG18BA	1323	EGHV0127	P	5.1.3	CCW HX Out to RCS Bypass Iso Valve
14EGG18BB	1323	EGHV0127	C	5.1.3	CCW HX Out to RCS Bypass Iso Valve
14EGG18DA	1323	EGHV0133	P	5.1.3	Thermal Barrier CCW Return to RCS Bypass Iso

Table A-24-4
PFSSD Cables Located in Fire Area A-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EGG18DB	1323	EGHV0133	C	5.1.3	Thermal Barrier CCW Return to RCS Bypass Iso
14EMG02DA	1323	EMHV8801B	P	5.1.5	BIT Outlet Iso Valve to RCS
14EMG02DB	1323	EMHV8801B	C	5.1.5	BIT Outlet Iso Valve to RCS

5.2.1 Steam Generator Atmospheric Relief Valves

Cables associated with steam generator atmospheric relief valves (ARVs) ABPV0002, ABPV0003 and ABPV0004 are run in area A-24. The effects of fire damage to these cables are discussed in the following paragraphs.

Cable 12ABI20FE provides a signal from ARV ABPV0002 controller to pressure transducer ABPY0002. Cable 12ABI20FH provides a signal from ABPT0002 to ARV ABPV0002 controller. The transducer signals the position controller (ABZC0002) on ABPV0002 to open whenever steamline pressure reaches a designated setpoint. The cables are run in raceway that has been protected with a 3-hour fire rated barrier. Therefore, the cables will remain free of fire damage in the event of a fire in this area and ARV ABPV0002 can be controlled from the control room.

Cable 13ABI20GE provides a signal from ARV ABPV0003 controller to pressure transducer ABPY0003. Cable 13ABI20GA provides a signal from ABPT0003 to ARV ABPV0003 controller. The transducer signals the position controller (ABZC0003) on ABPV0003 to open whenever steamline pressure reaches a designated setpoint. Damage to the cables due to a fire could cause a spurious signal which could open the ARV. Damage to cable 13ABI20GE could prevent manual operation of the valve from the control room.

Cable 14ABI20HH provides a signal from ABPT0004 to ARV ABPV0004 controller and opens the valve when steamline pressure reaches a designated setpoint. The cable is run in raceway that has been protected with a 3-hour fire rated barrier. Therefore, the cable will remain free of fire damage in the event of a fire in this area.

Based on the above discussion, ARVs ABPV0001 and ABPV0004 can be controlled from the control room if using Train B MDAFP. If Train A MDAFP is used, ARV ABPV0002 can be controlled from the control room while ARV ABPV0003 may need to be controlled using local controller ABFHC0003 in area A-23. See Section 5.2.3 for a discussion on auxiliary feedwater availability.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB20A, E-13AB20B, E-13AB21, E-1F9101, E-1R1343C, E-106-00027, M-12AB01, DCP 07037

5.2.2 Safety Injection and Containment Spray

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. A spurious containment spray actuation signal (CSAS) could cause the containment spray pumps to operate, depleting inventory in the RWST. These conditions are not desirable for PFSSD at Wolf Creek.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and, ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure

transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Containment spray (CS) is initiated automatically by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937.

Only cables associated with steam line pressure transmitters ABPT0515, ABPT0516, ABPT0525, ABPT0526, ABPT0535, ABPT0536, ABPT0545 and ABPT0546 are run in area A-24. Cables associated with ABPT0515, ABPT0516 ABPT0525, ABPT0535, ABPT0545 and ABPT0546 are installed in raceway that has been protected with a 3-hour fire rated barrier. Therefore, the cables will remain free of fire damage in the event of a fire in this area. Consequently, two out of three logic for low steam line pressure initiation of SIS cannot be satisfied if a fire occurs in area A-24.

Cables associated with containment pressure transmitters and pressurizer pressure transmitters are not located in this fire area. Consequently, a spurious CSAS and SIS is not credible if a fire occurs in area A-24.

Containment spray valve ENHV0006 and associated power and control cables are located in this fire area. Damage to the control cables could cause the valve to spuriously open. However, as stated in the previous paragraph, a spurious CSAS is not credible if a fire occurs in this area. In addition, control cables associated with the Train A containment spray pump are located outside fire area A-24. Therefore, the Train A containment spray pump will not spuriously start if a fire occurs in area A-24.

Based on the above discussion, a spurious SIS and CSAS is not credible if a fire occurs in area A-24. In addition, containment spray will not occur if valve ENHV0006 spuriously opens.

References: E-15000, XX-E-013, E-13AB21, E-13EN03, E-106-00027, E-1F9431, E-1F9432, E-1F9433, E-1R1343C, E-1R1911, M-12AB01, M-12EN01, DCP 07037

5.2.3 Auxiliary Feedwater

Several cables associated with auxiliary feedwater are run in this area. The following paragraphs describe the effects of fire damage on PFSSD.

Cables 12ABK01AF and 12ABK01BF are control cables associated with main steam to turbine driven auxiliary feedwater pump (TDAFP) supply valves ABHV0005 and ABHV0006, respectively. Damage to these cables could cause the valves to fail closed, although this is unlikely due to the fail safe design of the circuit (valve fails open on loss of power). In addition, several other cables associated with various components for the TDAFP are run in this area and could be damaged. Therefore, the TDAFP is not available in the event of a fire in area A-24.

Cables 12SAZ23AA and 12SAZ23BA provide status panel indication of the position of valves ABHV0005 and ABHV0006, respectively. Damage to these cables could cause false position indication in the main control room. As stated above, the TDAFP is unavailable if a fire occurs in this area and, therefore, damage to these cables will not adversely impact PFSSD.

Cables associated with several valves in the auxiliary feedwater system are run in this area. These valves include the Train B motor driven auxiliary feedwater pump (MDAFP) to steam generators A and D valves ALHV0005 and ALHV0007 and the TDAFP to steam generators B and C valves ALHV0010 and ALHV0012. A majority of these cables are run in raceway that has been wrapped with a 3-hour fire rated material. In addition, cables associated with flow transmitters ALFT0001 and ALFT0007 are run in raceway that has been wrapped with a 3-hour fire rated material. These flow transmitters provide a signal to modulate valves ALHV0005 and ALHV0007 in response to flow going to steam generators D and A, respectively.

Two cables (14ALY09AB and 14ALY09BB) associated with ALHV0005 and ALHV0007 are not protected and could be damaged. These are power cables associated with the Modutronic controller. Valves ALHV0005 and ALHV0007 are normally full open and fail full open on loss of power to the controllers. This could cause a loss of control of these valves but would not prevent flow of auxiliary feedwater to steam generators A and D.

Cables associated with two of the three pressure transmitters that initiate an AFW low suction pressure (LSP) signal run in this area. Cable 12ALI08BA is associated with pressure transmitter ALPT0038. Cable 14ALI08CA is associated with pressure transmitter ALPT0039. Damage to these cables could cause a spurious LSP signal (2/3 logic) and initiate auxiliary feedwater suction swapover to the ESW system. Both cables are run in raceway that has been wrapped with a 3-hour fire rated material. Therefore, the cables will remain free of fire damage in the event of a fire in this area and a spurious LSP signal will not occur.

Cable 14ALI07HD is associated with MDAFP B suction pressure transmitter ALPT0024. This cable is run in raceway that has been wrapped with a 3-hour fire rated material. Therefore, this cable is unaffected by a fire and ALPT0024 is available.

Based on the above discussion, auxiliary feedwater is available using Train B MDAFP supplying steam generators A and D through valves ALHV0005 and ALHV0007.

References: E-15000, XX-E-013, E-13AB01, E-13AL03A, E-13AL03B, E-13AL05A, E-13AL05B, E-13AL07B, E-13AL08, E-13AL09, E-13FC23, E-13FC24, E-1F9101, E-1F9202, E-1F9203, E-1F9204, J-601A-00165, M-12AB02, M-12AL01, M-12FC02

FIRE AREA A-25

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-25 is located on the 2000 elevation of the Auxiliary Building and includes the room listed in Table A-25-1.

Table A-25-1
Room Located in Fire Area A-25

ROOM #	DESCRIPTION
1322	Pipe Penetration Room B

Fire area A-25 is protected with automatic fire detection throughout. There is no automatic fire suppression installed. The area is separated from other areas by minimum 3-hour fire rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-24-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-25-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-25

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
BB	Reactor Coolant System	R, M, H, P, S	Cables associated with pressure transmitter BBPT0403 could be damaged, causing a false High-1 RCS pressure signal. This would prevent remote opening of BBPV8702A and BBPV8702B. A cold shutdown repair or containment entry may be required to open valves BBPV8702A or BBPV8702B when aligning RHR for cold shutdown.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
EF	Essential Service Water System	H, S	Valves EFHV0032 and EFHV0050 associated with Train B ESW to/from the Train B containment coolers may be affected. Valves associated with Train A containment coolers are unaffected.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
EJ	Residual Heat Removal System	M, H, P	As stated in System BB above, the suction source for RHR could be affected. All other components of the RHR system are unaffected, or the effects of fire damage to the cables will have no adverse impact on PFSSD.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.

Table A-25-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-25

System	System Name	PFSSD Function*	Comments
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
GN	Containment Coolers	S	ESW to Train B containment coolers may be affected as described in System EF above. ESW to Train A containment coolers is unaffected.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
KA	Instrument Air	S	Valve KAV0201 is located in this fire area. This valve is used as an alternate means to isolate letdown. The ability to isolate letdown from the control room is unaffected. Therefore, valve KAV0201 is not required for PFSSD if a fire occurs in this area. Valve KAFV0029 could be affected by a fire in this area. This will have no adverse impact on PFSSD.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.

Table A-25-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-25

System	System Name	PFSSD Function*	Comments
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.

Table A-25-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-25

System	System Name	PFSSD Function*	Comments
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-25.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-25. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None specific to PFSSD

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 Residual Heat Removal

A cold shutdown repair or containment entry may be required to open valves BBPV8702A or BBPV8702B, depending on the RHR train used for cold shutdown.

4.0 CONCLUSION

Post Fire Safe Shutdown is assured for a fire in fire area A-25. Redundant capability exists for achieving and maintaining PFSSD if a fire occurs in area A-25.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-25.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-25

PFSSD components (S. in E-15000) located in fire area A-25 are shown in Table A-25-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-25-3.

Table A-25-3
PFSSD Equipment Located in Fire Area A-25

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1322	BBHV8351A	RCP A Seal Water Supply	5.1.1	
1322	BBHV8351B	RCP B Seal Water Supply	5.1.1	
1322	BBHV8351C	RCP C Seal Water Supply	5.1.1	
1322	BBHV8351D	RCP D Seal Water Supply	5.1.1	
1322	EFHV0032	ESW B to Containment Air Coolers	5.1.2	
1322	EFHV0050	ESW B from Containment Air Coolers	5.1.2	
1322	EJHV8809B	RHR To Accumulator Injection Loops 3 & 4 Iso Valve	5.1.3	
1322	EJHV8840	RHR/SI Hot Leg Loops 2 and 3 Recirc Iso Valve	5.1.3	
1322	ENHV0012	CTMT Spray Train B Discharge Iso Valve	5.2.1	
1322	KAFV0029	Containment Instrument Air Supply Valve	5.1.4	
1322	KAV0201	AUX Bldg To RX Bldg Instrument Air Outside CTMT Iso	5.1.4	
1322	TB13303	RCS Wide Range Pressure Transmitter BBPT0403	5.1.3	

5.1.1 Reactor Coolant Pump (RCP) Seal Injection

RCP seal injection is required to provide a boron injection path, provide makeup to the RCS and prevent damage to the RCP seals. Seal injection valves BBHV8351A, BBHV8351B, BBHV8351C and BBHV8351D, and associated power and control cables, are located in this area. In order to ensure seal injection, these valves are required to remain in their normally open position.

The seal injection valves are maintained de-energized with the circuit breaker in the OFF position. Therefore, damage to the control cables will not cause the valves to close. The valves are not high-low pressure interface valves so consideration of a 3-phase hot short is not required. Therefore, damage to the power cables will not cause the valves to close.

Based on the above discussion, RCP seal injection is unaffected by a fire in area A-25.

References: E-15000, XX-E-013, E-13BB04, E-1F9102, E-1F9303, M-12BB03

5.1.2 Containment Cooling

At least one train of containment cooling is required for PFSSD to maintain the containment atmosphere within EQ limits.

Valves EFHV0032 and EFHV0050, and associated power and control cables, are located in this area. These valves are in the flowpath from Train B ESW to/from the Train B containment coolers. Damage to these valves and cables could cause the valves to spuriously close, isolating ESW to the Train B containment coolers.

Valves associated with Train A containment coolers are located in a separate fire area and are unaffected by a fire in this area. Therefore, Train A containment coolers are available to maintain the containment atmosphere if a fire occurs in this area.

References: XX-E-013, E-15000, E-13EF07, E-13EF08, E-1F9403, M-12EF02

5.1.3 Residual Heat Removal

For cold shutdown, the RHR pump discharge to RCS cold leg isolation valve (EJHV8809A or EJHV8809B) needs to be open on the operating train. In addition, the hot leg recirculation valve EJHV8840 is required to remain closed. Valves EJHV8809B and EJHV8840, and associated cables, are located in area A-25.

Damage to cables 14EJG09BA and 14EJG09BB will result in valve EJHV8809B remaining in its as-is normally open position, which is the preferred PFSSD position. There are no postulated cable failures that would cause the valve to close. Cables associated with Train A valve EJHV8809A do not run in area A-25. Therefore, both Trains A and B RHR pump discharge to RCS cold leg flow paths are available for a fire in area A-25.

Damage to cables 14EJG09AA and 14EJG09AB will result in valve EJHV8840 remaining in its as-is normally closed position, which is the required PFSSD position. There are no postulated cable failures that would cause the valve to open. Therefore, valve EJHV8840 will remain closed if a fire occurs in this area.

Hot shutdown mode of PFSSD requires isolation of the RCS to RHR flow path by maintaining either BBPV8702A or EJHV8701A closed and either BBPV8702B or EJHV8701B closed. Cold shutdown mode of PFSSD requires RHR taking suction from the RCS. RHR pump suction from the RCS is controlled by valves BBPV8702A and EJHV8701A (Train A) and BBPV8702B and EJHV8701B (Train B).

Terminal Box TB13303 contains cables 12BBI15NA and 12BBI15NB. Damage to cables 12BBI15NA and 12BBI15NB, associated with pressure transmitter BBPT0403, could initiate a false High-1 RCS pressure signal and open the contacts on relay K734. This false High-1 pressure signal would prevent remote opening of valves BBPV8702A and BBPV8702B. Since cables 12BBI15NA and 12BBI15NB run through area A-25, a fire may require a cold shutdown repair or a containment entry to open valves BBPV8702A or BBPV8702B, depending on the RHR train used for cold shutdown.

References: E-15000, XX-E-013, E-13BB12A, E-13BB12B, E-13BB15, E-13EJ09A, E-1F9205, M-12BB04, M-12EJ01

5.1.4 Containment Instrument Air Supply

The containment instrument air supply provides the motive force for a number of air operated valves in containment. The instrument air system is not credited for PFSSD because loss of instrument air will fail the valves in their desired position. Isolation valves for the containment instrument air supply are credited for PFSSD because, in the event of a fire in certain areas, it may be necessary to close the valves to fail certain valves closed.

Manual isolation valve KAV0201 and air operated valve KAFV0029 are credited in the PFSSD analysis in the event of a fire in certain areas. These valves are used to isolate air to letdown isolation valves BGLCV0459 and BGLCV0460 and pressurizer spray valves BBPCV0455B and BBPCV0455C to fail the valves closed. Valves KAV0201 and KAFV0029 are diverse means for closing BGLCV0459, BGLCV0460, BBPCV0455B and BBPCV0455C if the fire prevents closing the valves using their respective control room hand switches. Only one of these valves is required to be closed to isolate instrument air to containment.

Cable 11KAK02AA is a control cable associated with valve KAFV0029. Damage to this cable could prevent closure of the valve from the control room or could cause the valve to spuriously close. If the valve spuriously closes, PFSSD will not be affected as documented in E-1F9900.

A fire in area A-25 does not require closure of the air supply to containment to achieve PFSSD. Letdown isolation valves BGLCV0459 and BGLCV0460 and pressurizer spray valves BBPCV0455B and BBPCV0455C are unaffected by a fire in this area and can be closed from the control room.

Based on the above discussion, damage to cable 11KAK02AA will have no adverse impact on the ability to achieve and maintain safe shutdown following a fire in this area. In addition, valves KAV0201 and KAFV0029 are not credited for a fire in area A-25.

References: E-15000, XX-E-013, E-13KA02, E-1F9301, M-12KA01, E-1F9900

5.2 PFSSD CABLE EVALUATION

Table A-25-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-25. The applicable evaluation section is also listed in Table A-25-4.

Table A-25-4
PFSSD Cables Located in Fire Area A-25

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11KAK02AA	1322	KAFV0029	C	5.1.4	Containment Instrument Air Supply Valve
12BBI15NA	1322	BBPT0403	I	5.1.3	RCS Wide Range Press Chan #2
12BBI15NB	1322	BBPT0403	I	5.1.3	RCS Wide Range Press Chan #2
12GNI05BA	1322	GNPT0936	I	5.2.1	Containment Pressure Transmitter
14BBG04AA	1322	BBHV8351A	P	5.1.1	RCP A Seal Water Supply
14BBG04AB	1322	BBHV8351A	C	5.1.1	RCP A Seal Water Supply
14BBG04BA	1322	BBHV8351B	P	5.1.1	RCP B Seal Water Supply
14BBG04BB	1322	BBHV8351B	C	5.1.1	RCP B Seal Water Supply
14BBG04CA	1322	BBHV8351C	P	5.1.1	RCP C Seal Water Supply
14BBG04CB	1322	BBHV8351C	C	5.1.1	RCP C Seal Water Supply
14BBG04DA	1322	BBHV8351D	P	5.1.1	RCP D Seal Water Supply
14BBG04DB	1322	BBHV8351D	C	5.1.1	RCP D Seal Water Supply
14EFG07BA	1322	EFHV0032	P	5.1.2	ESW B To CTMT Air Coolers
14EFG07BB	1322	EFHV0032	C	5.1.2	ESW B To CTMT Air Coolers
14EFG08BA	1322	EFHV0050	P	5.1.2	ESW B From CTMT Air Coolers
14EFG08BB	1322	EFHV0050	C	5.1.2	ESW B From CTMT Air Coolers
14EJG09AA	1322	EJHV8840	P	5.1.3	RHR/SI Hot Leg Loops 2 and 3 Recirc Valve
14EJG09AB	1322	EJHV8840	C	5.1.3	RHR/SI Hot Leg Loops 2 and 3 Recirc Valve
14EJG09BA	1322	EJHV8809B	P	5.1.3	RHR To Accumulator Inj Loops 3 & 4 Iso Valve
14EJG09BB	1322	EJHV8809B	C	5.1.3	RHR To Accumulator Inj Loops 3 & 4 Iso Valve
14ENG03BA	1322	ENHV0012	P	5.2.1	CTMT Spray Train B Disch Iso Valve
14ENG03BB	1322	ENHV0012	C	5.2.1	CTMT Spray Train B Disch Iso Valve

5.2.1 Containment Pressure Transmitters

Containment pressure transmitters initiate a Safety Injection Signal (SIS) on two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936. In addition, a Containment Spray Actuation Signal (CSAS) is activated by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937.

A cable associated with pressure transmitter GNPT0936 is run in area A-25. Cables associated with the remaining pressure transmitters are located in a separate fire area. Therefore, a spurious SIS or CSAS will not occur due to a fire in area A-25.

Cables 14ENG03BA and 14ENG03BB are associated with valve ENHV0012. Valve ENHV0012 and associated cables were added to the PFSSD equipment list to mitigate a spurious containment spray if a fire occurs in area C-10. A fire in area A-25 will not result in a spurious CSAS. Therefore, the valve is not required to function if a fire occurs in area A-25 and damage to cables 14ENG03BA and 14ENG03BB will have no adverse impact on safe shutdown.

References: E-15000, XX-E-013, E-13EN03, E-13GN05, E-1F9431, E-1F9432, E-1F9433, M-12EN01, M-12GN01, DCP 12081

FIRE AREA A-26

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1.0 GENERAL AREA DESCRIPTION

Fire area A-26 is located on the 2026 elevation of the Auxiliary Building and includes the rooms listed in Table A-26-1.

Table A-26-1
Rooms Located in Fire Area A-26

ROOM #	DESCRIPTION
1405	Chemical Storage Area
1415	I & C Hot Shop

Fire area A-26 is protected with an automatic fire detection system throughout. The area is bounded on all sides by minimum 3-hour fire rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-26-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-26-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-26

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
EF	Essential Service Water System	H, S	All PFSSD functions associated with the Essential Service Water (ESW) system are satisfied. The ability to operate Train B valves EFHV0052 and EFHV0060 from the control room may be affected. The valves will not spuriously operate. Train A ESW is unaffected.
EG	Component Cooling Water System	S	All PFSSD functions associated with the Component Cooling Water (CCW) system are satisfied. Bypass valves EGHV0127 and EGHV0133 may be affected. This will not affect the ability to supply CCW to the RCP thermal barriers.
EJ	Residual Heat Removal System	M, H, P	Containment sump isolation valve EJHV8811B could spuriously open, causing a draindown path from the RWST to the containment sump. Valve BNHV8812B will automatically close, as designed, when EJHV8811B reaches full open position, mitigating draindown. However, if EJHV8811B stalls before reaching full open position, BNHV8812B will not automatically close. In this case, operators can close BNHV8812B using BNHIS8812B in the main control room.

Table A-26-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-26

System	System Name	PFSSD Function*	Comments
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
GL	Auxiliary Building HVAC	S	Train B CCW pump room cooler SGL11B may be affected. Train A CCW pump room cooler SGL11A is unaffected.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
GN	Containment Coolers	S	The PFSSD Support function associated with the Containment Coolers is satisfied. Train B containment coolers SGN01B and SGN01D may not be available due to possible loss of 480 VAC power. Train A containment coolers SGN01A and SGN01C are unaffected.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.

Table A-26-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-26

System	System Name	PFSSD Function*	Comments
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
NG	480V Load Centers and MCCs	S	Train B Class 1E 480 VAC MCCs NG02B, NG02T and NG04T may be affected. Redundant Train A Class 1E 480 VAC MCCs are unaffected.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.

Table A-26-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-26			
System	**System Name**	**PFSSD Function***	**Comments**
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-26.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-26. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Mitigation of RWST Draindown to Containment Sump

If a fire occurs in area A-26, it may be necessary to close valve BNHV8812B from the control room using BNHIS8812B to mitigate draindown of the RWST into the containment sump. This condition could occur due to EJHV8811B spuriously opening but stalling before reaching full open position, thereby not providing the permissive for BNHV8812B to close. RWST level indication is available using all four level indicators.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-Fire Safe Shutdown capability is assured if a severe fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-26.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-26

There are no PFSSD components located in area A-26. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table A-26-3 lists all the PFSSD cables (S. in E-15000) located in fire area A-26. The applicable evaluation section is also listed in Table A-26-3.

Table A-26-3
PFSSD Cables Located in Fire Area A-26

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EFG04BA	1405, 1415	EFHV0060	P	5.2.1	ESW return to UHS from CCW B Hx
14EFG04BB	1405, 1415	EFHV0060	C	5.2.1	ESW return to UHS from CCW B Hx
14EFG05BA	1405, 1415	EFHV0052	P	5.2.1	ESW to CCW B Heat Exchanger
14EFG05BB	1405, 1415	EFHV0052	C	5.2.1	ESW to CCW B Heat Exchanger
14EGG18BA	1415	EGHV0127	P	5.2.1	Thermal Barrier Cooling
14EGG18BB	1415	EGHV0127	C	5.2.1	Thermal Barrier Cooling
14EGG18DA	1415	EGHV0133	P	5.2.1	Thermal Barrier Cooling
14EGG18DB	1415	EGHV0133	C	5.2.1	Thermal Barrier Cooling
14EJG06BT	1405	EJHV8811B	C	5.2.3	CTMT Recirc Sump To RHR Pump B
14GLG06BA	1405	DSGL11B	P	5.2.1	Train B CCW Pumps B and D Room Cooler
14GLG06BC	1405	DSGL11B	C	5.2.1	Train B CCW Pumps B and D Room Cooler
14NGG01AD	1405	NG02B	P	5.2.2	Incoming Power Feed to NG02B from NG0207
14NGG01AE	1405	NG02B	P	5.2.2	Incoming Power Feed to NG02B from NG0207
14NGG01AJ	1405	DSGN01B	P	5.2.2	Incoming Power Feed to NG02T from NG0208
14NGG01BF	1405	DSGN01D	P	5.2.2	Incoming Power Feed to NG04T from NG0405

5.2.1 Essential Service Water and Component Cooling Water

For PFSSD, component cooling water (CCW) relies on essential service water (ESW) to provide cooling to the CCW heat exchanger. When operating Train A CCW, valve EFHV0051 is required to remain open (throttled) and valve EFHV0059 is required to remain closed with manual bypass valve EFV0058 throttled. When operating Train B CCW, valve EFHV0052 is required to remain open (throttled) and valve EFHV0060 is required to remain closed with manual bypass valve EFV0090 throttled. If valves EFHV0059 or EFHV0060 were to open, a flow imbalance will occur in the associated ESW Train such that sufficient ESW flow may not reach other PFSSD components.

Cables 14EFG04BA and 14EFG04BB, associated with valve EFHV0060, are run in area A-26. Damage to these cables (hot short, open circuit or short to ground) will not cause the valve to spuriously open. The only failure in the control circuit for this valve that could cause the valve to open would be a short within cable 14EFG04BC, which is not run in area A-26. Therefore, there are no credible circuit failures that would cause valve EFHV0060 to spuriously open.

Cables 14EFG05BA and 14EFG05BB, associated with valve EFHV0052, are run in area A-26. Damage to these cables (hot short, open circuit or short to ground) will not cause the valve to spuriously close. The only failure in the control circuit for this valve that could cause the valve to close would be a short within cable 14EFG05BC, which is not run in area A-26. Therefore, there are no credible circuit failures that would cause valve EFHV0052 to spuriously close.

Train A ESW to/from CCW heat exchanger valves EFHV0051 and EFHV0059 are unaffected by a fire in area A-26. Therefore, the Train A CCW system is available if a fire occurs in area A-26.

Cables 14EGG18BA and 14EGG18BB, associated with normally closed valve EGHV0127, are run in area A-26. Cables 14EGG18DA and 14EGG18DB, associated with normally closed valve EGHV0133, are run in area A-26. Valves EGHV0127 and EGHV0133 are required to ensure thermal barrier cooling if valves EGHV0058 and EGHV0061 are affected by a fire. Valves EGHV0058 and EGHV0061 are unaffected by a fire in area A-26, so the position of valves EGHV0127 and EGHV0133 has no adverse impact on PFSSD. In addition, a fire in this area does not affect RCP seal injection, so thermal barrier cooling is not required.

Power and control cables 14GLG06BA and 14GLG06BC, associated with Train B CCW pump room cooler motor DSGL11B, are run in fire area A-26. Damage to these cables could prevent operation of the room cooler. Loss of the Train B CCW pump room cooler will not result in an immediate loss of the Train B CCW system. Therefore, if the Train B CCW system is operating at the time of the fire, it can continue to operate until the Train A CCW system is lined up. Cables associated with Train A CCW room cooler SGL11A are not run in area A-26. Therefore, the Train A CCW room cooler is available.

Based on the above discussion, Train A and Train B CCW and ESW are available if a fire occurs in area A-26.

References: E-15000, XX-E-013, E-13EF04A, E-13EF05, E-13EG18, E-13EG18A, E-13GL06, E-1F9303, E-1F9403, E-1F9444, M-12EF02, M-12EG03

5.2.2 Class 1E 480 Volt AC Power

Motor control center (MCC) NG02B could lose power due to damage to cables 14NGG01AD and 14NGG01AE. If this occurs, power to a number of Train B PFSSD components could be lost. Train A MCCs are unaffected by a fire in area A-26 and are available to supply power to redundant Train A PFSSD components.

MCCs NG02T and NG04T could lose power due to damage to cables 14NGG01AJ and 14NGG01BF, respectively. These MCCs supply power to Train B containment coolers SGN01B and SGN01D. Train A containment coolers SGN01A and SGN01C are unaffected by a fire in area A-26 and are available to provide required containment cooling.

Based on the above discussion, loss of power to NG02B, NG02T and NG04T will not adversely impact the ability to achieve and maintain safe shutdown following a fire in area A-26.

References: E-15000, XX-E-013, E-11NG20, E-13NG01A, E-1F9424A, E-1F9424B, M-12GN01

5.2.3 Containment Sump Isolation Valves

Cable 14EJG06BT, associated with containment sump isolation valve EJHV8811B, is run in this area. Damage to this cable could cause the valve to open, momentarily causing the RWST to drain to the containment sump due to normally open valve BNHV8812B. Cables associated with BNHV8812B are unaffected by a fire in this area.

If valve EJHV8811B fully opens, valve BNHV8812B will automatically close, preventing draindown of the RWST to the containment sump. If valve EJHV8811B spuriously opens but stalls before reaching full open position, valve BNHV8812B will not automatically close. If this occurs, operators will recognize a decreasing RWST level using any of the four RWST level indicators and take action to close BNHV8812B using BNHIS8812B in the main control room.

Based on the above discussion, damage to cables associated with valve EJHV8811B will not adversely impact safe shutdown.

References: E-15000, XX-E-013, E-13EJ06B

FIRE AREA A-27

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1.0 GENERAL AREA DESCRIPTION

Fire area A-27 is located on the 2026 elevation of the Auxiliary Building and includes the room listed in Table A-27-1.

Table A-27-1
Room Located in Fire Area A-27

ROOM #	DESCRIPTION
1403	Rod Drive/MG Set Room

Fire area A-27 is protected with a total flooding Halon fire suppression system. In addition, automatic fire detection is installed throughout. The automatic suppression and detection system meets the intent of 10CFR50, Appendix R, Section III.G.2.c.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-27-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-27-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-27

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	All PFSSD functions associated with the main steam system are satisfied. Steam generator A and D ARVs can be controlled from the control room. Local control stations ABFHC0002 and ABFHC0003 may be required to close steam generator B and C atmospheric relief valves ABPV0002 and ABPV0003. ABHS0080 is available to close the MSIVs and MSIV bypass valves. A spurious safety injection signal (SIS) due to low steam line pressure on two out of three steam line pressure transmitters is averted by entering the EMG procedure network and, if necessary, placing EMHIS0004 and EMHIS0005 in pull-to-lock. Control of main steam flow to the TDAFP using ABHV0005 and ABHV0006 may be lost. Steam generator pressure indication is available using ABPI0514A, ABPI0516A, ABPI0524A, ABPI0534A, ABPI0544A and ABPI0545A.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27. Steam generator A wide range level indicator AELI0501 and narrow range level indicator AELI0551 are available. Steam generator D narrow range level indicator AELI0554 is available.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. Motor Driven Auxiliary Feedwater Pump (MDAFP) A is available to supply feedwater to SGs B and C. However, steam generator B and C ARVs ABPV0002 and ABPV0003 may need to be controlled locally. Motor Driven Auxiliary Feedwater Pump (MDAFP) B is available to supply feedwater to SGs A and D. The TDAFP may be affected.
AP	Condensate Storage System	H	The condensate storage tank is available to supply water to Train B MDAFP.

Table A-27-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-27

System	System Name	PFSSD Function*	Comments
BB	Reactor Coolant System	R, M, H, P, S	All PFSSD functions associated with the reactor coolant system are satisfied. Loss of inventory through the head vent valves is prevented by maintaining valves BBHV8001A and BBHV8001B closed. Pressurizer level indication is available using level indicator BBLI0459A. Pressurizer pressure indication is available using BBPI0455A located on RL002. RCS pressure indication is available using BBPI0405 on RL022. A spurious SIS due to low pressurizer pressure on two out of four pressurizer pressure transmitters is mitigated by entering EMG E-0 and terminating the spurious SIS. When transferring to RHR, valve BBPV8702B may need to be manually opened to provide a suction source from the RCS to RHR pump B. Pressurizer PORV BBPCV0456A may open and block valve BBHV8000B may not close. If this occurs Operators can close the PORV by placing BBHIS0456A in the CLOSE position. To mitigate a spurious opening of PORV BBPCV0455A, close block valve BBHV8000A using BBHIS8000A. All four reactor coolant pumps may not stop using the control room hand switch. RCP seal injection remains available. Therefore, the inability to stop the RCPs will have no adverse impact on PFSSD. A spurious CISB due to 2/4 high containment pressures will isolate the CCW to/from RCP valves, which will isolate thermal barrier cooling. This is acceptable since RCP seal injection remains available.
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. Train A centrifugal charging pump (CCP) may be unavailable due to the potential loss of Train A component cooling water (CCW) which supplies cooling to the CCP oil cooler. Train B CCP is available to provide charging flow from the RWST to the RCP seals. Flow from the VCT can be isolated by closing either BGLCV0112B or BGLCV0112C. Valves BGHV8154A and BGHV8153B are maintained closed to isolate excess letdown. Non-Class 1E 125 VDC power to valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B and BGHV8149C could be affected. If this occurs, the valves will fail closed which is the desired PFSSD position. Valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B and BGHV8149C may not automatically close on a low pressurizer level signal. The valves can be closed by isolating air to containment using KAHIS0029 in the control room. Pressurizer level is available using BBLI0459A. RCP seal flow indication is available using BGFI0215A. RCP seal flow indicator BGFI0215B may be affected.

Table A-27-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-27

System	System Name	PFSSD Function*	Comments
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blowdown system are satisfied. Steam generator blowdown is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C, located on the BM157 panel in the radwaste control room.
BN	Borated Refueling Water Storage System	R, M, H	The RWST is available to provide a suction source to Centrifugal Charging Pump B via valve BNLCV0112E. RWST level indicators BNLI0930, BNLI0931 and BNLI0932 are available.
EF	Essential Service Water System	H, S	All PFSSD functions associated with the Essential Service Water (ESW) system are satisfied. Train A ESW is available to supply cooling water to Train A Diesel Engine Coolers and Train A Containment Air Coolers SGN01A and SGN01C. Train B ESW is available to supply cooling to the Train B Diesel Engine Coolers, Train B Component Cooling Water (CCW) Heat Exchanger, Train B Motor Driven Auxiliary Feedwater (MDAFW) pump room cooler, CCW B pump room cooler SGL11B, Train B Centrifugal Charging Pump (CCP) room cooler SGL12B and Train B Residual Heat Removal (RHR) pump room cooler SGL10B.
EG	Component Cooling Water System	S	Train B CCW is available. Train A pumps could be lost due to damage to the power cables. It may be necessary to either perform a cold shutdown repair or manually open valve EGHV0102 when transitioning to RHR Train B. A spurious low discharge pressure on Train B discharge pressure transmitter may cause transfer to the standby CCW pump on Train B. If this occurs, both pumps will continue to operate. Since the pressure transmitter may be lost, it may be necessary to have an operator monitor the discharge pressure using a local pressure indicator. Train B temperature control valve EGTV0030 may not close as desired for PFSSD. However, this valve is designed to modulate based on CCW outlet temperature, which is acceptable for PFSSD. A spurious CISB due to 2/4 high containment pressures will isolate the CCW to/from RCP valves, which will isolate thermal barrier cooling. This is acceptable since RCP seal injection remains available. CCW flow indicators EGFI0128 and EGFI0129 are unaffected.

Table A-27-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-27

System	System Name	PFSSD Function*	Comments
EJ	Residual Heat Removal System	M, H, P	All PFSSD functions associated with the Residual Heat Removal (RHR) system are satisfied. Loss of RCS inventory through the RHR flow path is prevented by maintaining valves EJHV8701A and EJHV8701B closed. Valve EJHCV0607 may need to be manually re-opened if the fire causes the valve to close. Valve EJHV8840 could spuriously open. This will not affect hot standby but the valve will need to be closed prior to shutdown cooling. Valve EJHV8809B may spuriously close. This will not affect hot standby but the valve would need to be opened for shutdown cooling. RHR system flow diagnostic instrumentation is available using various available temperature indicators.
EM	High Pressure Coolant Injection	R, M	All PFSSD functions associated with the High Pressure Coolant Injection system are satisfied. A spurious SI signal is averted by entering the EMG procedure network and, if necessary, placing EMHIS0004 and EMHIS0005 in pull-to-lock.
EN	Containment Spray	R, M	All PFSSD functions associated with the Containment Spray system are satisfied. A spurious containment spray actuation signal (CSAS) due to spurious signals on two out of four containment pressure transmitters can be avoided by entering the EMG procedure network and, if necessary, placing the pump control hand switches ENHIS0003 and ENHIS0009 on control room panel RL017 in pull-to-lock.
EP	Safety Injection Accumulators	H	The PFSSD Decay Heat Removal function associated with the Safety Injection Accumulators is satisfied. Accumulator injection lines can be isolated by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. It may be necessary to make a containment entry to manually close EPHV8808B and EPHV8808D.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
FC	Auxiliary Turbines	R, H, P	All PFSSD functions associated with the Auxiliary Turbines are satisfied. The Turbine Driven Auxiliary Feedwater Pump is not used for a fire in area A-27. Valves FCHV0312 and FCFV0313 may open. The TDAFP should trip on overspeed if this occurs. Valve FCFV0105 may be affected. The MSIVs can be closed using all-close hand switch ABHS0080.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.

Table A-27-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-27

System	System Name	PFSSD Function*	Comments
GK	Control Room and Class 1E Switchgear Room Coolers	S	Class 1E electrical equipment A/C units SGK05A and SGK05B may stop due to a spurious fire isolation signal. The spurious signal can be bypassed by placing GKHS0101 (SGK05A) or GKHS0104 (SGK05B) located on panel RP068 in BYPASS then rotate GKHIS0100 (SGK05A) or GKHIS0103 (SGK05B) to the RUN position.
GL	Auxiliary Building HVAC	S	Train B CCW pump room cooler SGL11B may not be available. Loss of this cooler is acceptable based on PIR 2000-2646.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
GN	Containment Coolers	S	The PFSSD Support function associated with the Containment Coolers is satisfied. Train A (SGN01A and SGN01C) Containment Coolers are available. ESW Train A is available to supply cooling water to the containment coolers. Containment pressure indicators GNPI0934 and GNPI0937 are available.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
KC	Fire Protection	S	A spurious fire signal could occur due to damage to cables associated with the fire detection system in Halon protected ESF switchgear rooms, causing SGK05A and SGK05B to shut down. See GK system above for further information.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
NB	4.16 kV System	S	Offsite power from NB01 and NB02 may be lost. Both emergency diesel generator trains are available.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.

Table A-27-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-27

System	System Name	PFSSD Function*	Comments
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
PA	13.8kV	S	Breakers PA0105, PA0106, PA0206 and PA0207 could fail, causing loss of power to associated PFSSD equipment. Redundant capability is available.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
PG	480V Load Centers and MCCs	S	Both MCCs PG19G and PG20G could be lost. Alternate power sources are available to supply the PFSSD loads associated with these MCCs.
PK	125VDC	S	Power to 125VDC non-Class 1E distribution switchboards PK51, PK52 and PK61 could be lost. Loss of power to the associated PFSSD loads is acceptable since the components fail in the desired position.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
PN	120VAC	S	The PFSSD Support function associated with the 120VAC system is satisfied. Both power feeds to PN08 could be damaged. The alternate power feed to panel PN07 could be affected. The primary power feed to PN07 is unaffected.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.

Table A-27-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-27

System	System Name	PFSSD Function*	Comments
RL	Control Room MCB	S	The alternate non-Class 1E 120 VAC power to RL017/RL018 could be affected. The primary source of power is unaffected. Non-Class 1E 125 VDC power to RL013/RL014 and RL017/RL018 could be affected. This will not adversely impact PFSSD. Non-Class 1E 120 VAC power to RL023/RL024 could be affected. Loss of power will fail open several steam isolation valves located downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the main control room. Non-Class 1E 125 VDC power to RL001/RL002 could be affected. The PFSSD components that are affected are the letdown isolation valves and the letdown orifice valves. These valves fail closed on loss of power, which is the desired PFSSD position.
RP	Miscellaneous Control Panels	R, M, H, P, S	Several components associated with the RP system could be affected. However, PFSSD is assured.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
SB	Reactor Protection System	R, S	Both trains of reactor trip switchgear could be damaged. If necessary, the control rods can be inserted by de-energizing rod drive motor generators SF001 and SF002 by opening PA0106 and PA0207 using hand switches PGHIS0002 and PGHIS0003 on RL016.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
SE	Ex-Core Neutron Monitoring	R, P	Source Range monitor SENY0061A/B is available to provide source range monitoring.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-27.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-27. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Component Cooling Water Pressure

If necessary, locally monitor the Train B CCW pump discharge pressure using EGPI0026 or EGPI0028 due to damage to pressure transmitter EGPT0078 cable.

3.1.2 Steam Generator Atmospheric Relief Valves

Cables associated with SGARVs ABPV0002 and ABPV0003 may be damaged, preventing control of these valves from the control room. Local controllers ABFHC0002 and ABFHC0003, located in fire area A-23, can be used to close ARVs ABPV0002 and ABPV0003, respectively.

3.1.3 Steam Generator Blowdown to Blowdown Flash Tank Isolation

If a fire occurs in area A-27, cables for BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A may be damaged by the fire. Therefore, use BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C located on the BM157 panel in the Radwaste Control Room to close valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Pressurizer PORV/Block Valve

Pressurizer PORV BBPCV0455A could spuriously open due to control cable damage. If this occurs, operators can close the PORV using BBHIS455A or close block valve BBHV8000A using BBHIS8000A. Pressurizer pressure indication is available using BBPI0455A located on RL002.

3.2.2 Reactor Trip Switchgear

A fire in this area could affect both trains of reactor trip switchgear. If the reactor does not trip using SBHS0001 or SBHS0042, it will be necessary to insert the control rods by de-energizing rod drive motor generators SF001 and SF002 by opening breakers PA0106 and PA0207 using PGHIS0002 and PGHIS0003 on panel RL016.

3.2.3 Component Cooling Water Pumps

Train A component cooling water pumps could be unavailable due to damage to power cables. If Train A CCW is operating when the fire occurs, it may be necessary to transfer to Train B CCW.

Train B CCW pump discharge pressure transmitter circuit may spuriously indicate low discharge pressure, which would start the standby pump. If this occurs, single pump operation can be achieved by locking out one of the two pumps. Otherwise, both pumps would operate.

3.2.4 Steam Generator Atmospheric Relief Valves

Use steam generators A and D to control cooldown. SGARVs ABPV0001 and ABPV0004 are available and can be controlled from the control room.

3.2.5 MSIVs and MSIV Bypass Valves

The MSIV bypass valves may spuriously open. Cables for hand switch ABHS0079 may be damaged by the fire. Cables for redundant hand switch ABHS0080 are unaffected. Use ABHS0080 to close the MSIVs and MSIV bypass valves.

3.2.6 Safety Injection and Containment Spray

A spurious Safety Injection Signal (SIS) due to low steamline pressure, low pressurizer pressure and high containment pressure can be mitigated by consulting EMG E-0 and terminating the spurious SIS.

A spurious start of the CS pumps due to two out of four low containment pressures can be mitigated by placing the pump control hand switches ENHIS0003 and ENHIS0009 on control room panel RL017 in pull-to-lock.

3.2.7 Class 1E Switchgear Room Coolers SGK05A and SGK05B

If SGK05A and SGK05B spuriously stop or cannot be started due to loss of power to the associated fire signal isolation relay, operators can bypass the spurious signal by placing GKHS0101 (SGK05A) or GKHS0104 (SGK05B) located on panel RP068 in BYPASS then rotate GKHIS0100 (SGK05A) or GKHIS0103 (SGK05B) to the RUN position. Indication is available for SGK05A and SGK05B on RP068.

3.2.8 Isolation of Letdown

Letdown valves BGLCV0459 and BGLCV0460 and letdown orifice isolation valves BGHV8149A, BGHV8149B and BGHV8149C may not close as a result of low pressurizer level signal. Operators can attempt to close the valves using their respective hand switches in the main control room. If this does not work, Operators can isolate instrument air to containment, using KAHIS0029, to fail the valves closed.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 Residual Heat Removal (RHR) Train B

It may be necessary to either perform a cold shutdown repair or manually open valve EGHV0102 in fire area A-16 when transitioning to RHR Train B.

It may be necessary to either perform a cold shutdown repair or manually open valve BBPV8702B in fire area RB-1 when transitioning to RHR Train B.

It may be necessary to either perform a cold shutdown repair or manually open valve EJHCV0607 in fire area A-9 when transitioning to RHR Train B.

Valve EJHV8840 could spuriously open in the event of a fire in this area. This will not affect hot standby, however the valve will need to be locally closed prior to entering shutdown cooling mode.

Valve EJHV8809B could spuriously close and may need to be manually opened prior to entering shutdown cooling mode of operation.

4.0 CONCLUSION

With some exceptions, redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-27.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-27

PFSSD components (S. in E-15000) located in fire area A-27 are shown in Table A-27-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-27-3.

Table A-27-3
PFSSD Equipment Located in Fire Area A-27

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1403	BB07	DC Contactor Panel for PORV BBPCV0455A	5.1.1	
1403	PG19G	480V Non-Class 1E Auxiliary Building MCC	5.1.2	
1403	PG19GAF8	Incoming Line from Load Center PG19	5.1.2	
1403	PG19GCR2	480V Non-Class 1E Distribution Panel	5.1.2	
1403	PG19GCF3	480V Non-Class 1E Power to PN03	5.1.2	
1403	PG19GFR3	Instrument Bus Transformer - Alt. Feed (XPN07D)	5.1.2	Alternate feed to PN07
1403	PG20	480VAC Non-Class 1E Load Center	5.1.3	
1403	PG2000	480V Non-Class 1E LC Feeder from PG2400	5.1.3	
1403	PG2001	480V Non-Class 1E LC Incoming Feeder	5.1.3	
1403	PG2008	480V Non-Class 1E Auxiliary Building MCC (PG20G)	5.1.3	
1403	PG20G	480V Non-Class 1E Auxiliary Building MCC	5.1.3	
1403	PG20GAF1	Incoming Line from Load Center PG20	5.1.3	
1403	PG20GAF4	480V Non-Class 1E Power to PN04	5.1.3	
1403	PG20GBR2	480V Non-Class 1E Distribution Panel	5.1.3	
1403	PG20GBR217	MCB Misc. Power Circuits (RL023)	5.1.3	
1403	PG20GER5	Instrument Bus Transformer - Alt. Feed (XPN08D)	5.1.3	Alternate feed to PN08
1403	PG2400	480V Non-Class 1E LC Feeder from PG1400	5.1.3	
1403	PK51	125VDC Non-Class 1E Distribution Switchboard	5.1.4	
1403	PK5100	125VDC Non-Class 1E Switchboard Incoming Feeder	5.1.4	
1403	PK5113	Master Supervisory Station (RP060)	5.1.4	
1403	PK5117	RC & Support Systems Control Pnl (RL001/RL002)	5.1.4	
1403	PK5123	Steam Generator Blowdown Control Panel (BM157)	5.1.4	
1403	PK5126	Auxiliary Relay Rack (RP330)	5.1.4	
1403	PK5129	Auxiliary Relay Rack (RP211)	5.1.4	

Table A-27-3
PFSSD Equipment Located in Fire Area A-27

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1403	PK52	125VDC Non-Class 1E Distribution Switchboard	5.1.5	
1403	PK5200	125VDC Non-Class 1E Switchboard Incoming Feeder	5.1.5	
1403	PK5213	Auxiliary Relay Rack (RP331)	5.1.5	
1403	PK61	125VDC Non-Class 1E Distribution Switchboard	5.1.6	
1403	PK6100	125VDC Non-Class 1E Switchboard Incoming Feeder	5.1.6	
1403	PK6106	Transformer Protection Relay Panel (MA0104E)	5.1.6	
1403	PK6108	Transformer Protection Relay Panel (MA0104E)	5.1.6	
1403	PK6115	Site Related Control Panel (RL013/RL014)	5.1.6	
1403	PK6116	ESF Control Panel (RL017/RL018)	5.1.6	
1403	PN03	10 kVA Inverter and Bypass Transformer	5.1.2	
1403	PN04	10 kVA Inverter and Bypass Transformer	5.1.3	
1403	SB102A	Reactor Trip Switchgear Cabinet - Train A	5.1.7	
1403	SB102B	Reactor Trip Switchgear Cabinet - Train A	5.1.7	
1403	SENY60A	Source Range Monitor	5.1.8	
1403	SENY60B	Source Range Monitor	5.1.8	
1403	XPG20	Load Center Transformer	5.1.3	

5.1.1 Pressurizer Power Operated Relief Valves and Associated Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed. Cables and components associated with PORVs BBPCV0455A and BBPCV0456A and block valve BBHV8000B are located in area A-27. A fire in this area could result in PORVs BBPCV0455A and BBPCV0456A spuriously opening and block valve BBHV8000B not responding to a close signal. Block valve BBHV8000A is unaffected by a fire in area A-27.

Panel BB07 is the DC contactor panel for PORV BBPCV0455A. Damage to this panel or associated cables due to a fire in area A-27 could cause PORV BBPCV0455A to spuriously open.

Instrument cables 12BBI16LB, 13BBI16MB and 14BBI16NB associated with pressurizer pressure transmitters BBPT0456, BBPT0457 and BBPT0458, respectively, are run in fire area A-27. As discussed in Calculation XX-E-013, Appendix 1, the Ovation pressurizer pressure control system uses 4-channel verification from all four pressurizer pressure transmitters to operate the pressurizer PORVs. Failure of a single channel will not cause the spurious operation of the PORVs since the system uses the 2nd highest input as the validated signal. Damage to two channels will not cause the PORVs to open because both channels would have to fail to the exact same value at the exact same time and therefore this failure mode is not credible.

The pressurizer PORVs are not considered high/low pressure interfaces. The valves are supplied power by an ungrounded 125 VDC system. Therefore, based on GL 86-10, consideration of multiple proper polarity hot shorts is not required. A single proper polarity hot short still needs to be considered.

A spuriously open PORV BBPCV0455A can be mitigated by either closing block valve BBHV8000A using BBHIS8000A in the control room or closing the PORV using BBHIS0455A . Pressurizer level and RCS pressure indication are available to diagnose a failed open PORV using BBLI0459A and BBPI0405, respectively. In addition, pressurizer pressure indication is available using BBPI0455A.

If a fire causes BBPCV0456A to open and damages BBHV8000B cables, Operators can close BBPCV0456A by placing hand switch BBHIS0456A, located on RL021, in the close position. Pressurizer level and RCS pressure indication are available to diagnose a failed open PORV using BBLI0459A and BBPI0405, respectively. In addition, pressurizer pressure indication is available using BBPI0455A.

Based on the above discussion, a fire in area A-27 could cause PORVs BBPCV0455A and BBPCV0456A to open due to damage to the PORV control cables. In addition, a fire in area A-27 could prevent block valve BBHV8000B from closing. The PORV can be re-closed using their respective hand switches in the control room. Also, block valve BBHV8000A can be closed from the control room using BBHIS8000A.

References: E-15000, XX-E-013, E-13BB16, E-13BB39, E-13BB40, E-1R1421, E-1R1424, J-200-00207, M-12BB02, M-761-02018, M-761A-00063, OFN KC-016, CR 13079, DCP 12944, DCP 13324

5.1.2 480VAC Non-Class 1E Auxiliary Building MCC PG19G (Separation Group 5)

Motor Control Center (MCC) PG19G, located in area A-27, supplies power to PFSSD components PN03 (10 kVA Inverter and Bypass Transformer), RL023/RL024 (Misc MCB Power Circuits), and XPN07D (Instr. Bus Transformer Alternate Feed). A fire in this area could disrupt power to PG19G, which would result in a loss of power to the PFSSD components described above.

MCC PG19G main power feeder cables 15PGG02AF and 15PGG02AX are run in a different fire area before they penetrate the floor of area A-27, directly below PG19G. The cables do not run in area A-27, except within the MCC cabinet.

MCC Cubicle PG19GCF3 supplies 480 VAC power to inverter PN03 (via cable 15PNG02AA). Redundant source of power to PN03 is from PK0105 (via cables 15PNK02AA and 15PNK02AB). Inverter PN03 supplies power to 120 VAC distribution panel PN310 (via cables 15PNY02AA and 15PNY02AB), which in turn supplies redundant 120 VAC power to NSSS control cabinets RP043 and RP047. For PFSSD, cabinet RP043 houses relays BGLCV0459X and BGLCV0460X, which are associated with letdown isolation valves BGLCV0459 and BGLCV0460, respectively. Cabinet RP047 includes controls for pressurizer PORVs and pressurizer spray.

A normally closed contact on relays BGLCV0459X and BGLCV0460X will open when the relay is energized following a low pressurizer level signal, causing the letdown isolation valves to close. This prevents loss of inventory through the normal letdown path if the pressurizer level is low. Loss of power to cabinet RP043 will prevent automatic closure of the letdown valves on low pressurizer level.

As discussed in Section 5.1.3, loss of the alternate source of power to RP043 and RP047, through PN04, can also occur if a fire occurs in area A-27. Therefore, a complete loss of power to RP043 and RP047 can occur if a fire occurs in this area.

Loss of power to RP043 will prevent the relays from performing their function but will not prevent PFSSD. If power is lost and the relays cannot be energized the letdown flow path can be closed by isolating air to containment using KAHIS0029 in the control room. Cables associated with KAFV0029 are unaffected by a fire in this area.

Cable 15PNY01AR is an alternate power feed from XPN07D to switchboard PN07, located in room 3409 (North Non-Essential Switchgear Room). Panel PN07 supplies power to main control board RL017 and RL018 through switch PN0736. The primary power to PN07 is from MCC NG01A located in room 3301 (North ESF Switchgear Room) and is unaffected by a fire in area A-27. Therefore, damage to cable 15PNY01AR, resulting in a loss of alternate power feed to PN07, will not affect PFSSD.

Cable 15RLY01HA supplies 120VAC power to MCB RL023/RL024 miscellaneous circuits from PG19GCR217. Several loads are supplied by this power supply, but only eight are PFSSD components. These are ABLV0051, ABLV0053, ABFV0023, ABFV0025, ABFV0027, ABFV0029, ABHIS0032 and FCHV0003 which are components downstream of the Main Steam Isolation Valves (MSIVs). Loss of power to ABLV0051, ABLV0053, ABFV0023, ABFV0025, ABFV0027, ABFV0029 and FCHV0003 will fail the valves open, which is not desired for PFSSD. Loss of power to ABHIS0032 will cause a loss of hand switch indicator lights. However, a fire in area A-27 does not affect the ability to close the MSIVs and MSIV bypass valves using hand switch ABHS0080 in the main control room. Therefore, the MSIV downstream components can fail in an undesired position without any consequence on PFSSD.

Based on the above discussion, a fire in area A-27 resulting in a loss of MCC PG19G will not impact the ability to achieve and maintain safe shutdown.

References: E-15000, XX-E-013, E-11PG20, E-11PG21, E-11PK01, E-11PN01, E-13AB02C, E-13BG10, E-13BG35, E-13PA02, E-13PG02, E-13PN01A, E-13RL07, E-13SC12, E-1F9421, E-1R1321, M-12BG01, M-761-00046, M-761-00174, M-761-02297, DCP 013324

5.1.3 480VAC Non-Class 1E Auxiliary Building MCC PG20G (Separation Group 6)

Motor Control Center (MCC) PG20G, located in area A-27, supplies power to PFSSD components RL023/RL024 (Misc MCB Power Circuits), XPN08D (Instr. Bus Transformer Alternate Feed), 10 kVA Inverter and Bypass Transformer PN04. A fire in this area could disrupt power to PG20G, which would result in a loss of power to the PFSSD components described above.

Load center transformer XPG020 is supplied 13.8kV power via cables 16PGG04AB and 16PGG04AC. These cables supply power from PG1400 to PG2400 and from PG2400 to PG2000, respectively. Damage to any of these cables will result in a loss of power to 480VAC load center PG20, which supplies power to PG20G. Cables 16PGG04AG and 16PGG04AR supply power from PG20 to PG20G. Damage to any of these cables will result in loss of power to PG20G.

Cable 16PNY01AR supplies non-class 1E 480 VAC power from PG20GER5 to transformer XPN08D. Cable 14PNG01AE supplies class 1E 480 VAC power from NG02BBF1 to NG02ADF1, which supplies 480 VAC to transformer XPN08A. Transformers XPN08A and XPN08D are the only sources of power to non-class 1E switchboard PN08. The PFSSD function of PN08 is to supply power from switch PN0833 to valve positioner EJHY0607 via RL017/RL018. Valve positioner EJHY0607 controls the position of Train B Residual Heat Removal (RHR) discharge valve EJHCV0607 using hand controller EJHIC0607. Both the primary and alternate power feeds to PN08 could be disrupted due to damage to cables 14PNG01AE and 16PNY01AR.

Panel PN08 also supplies non-class 1E 120 VAC power from switch PN0835 to RCS temperature recorders BBTR0433 and BBTR0443 via RL021/RL022. Loss of these temperature recorders will prevent indication of temperature on loop 3 (hot and cold legs) and loop 4 cold leg.

As discussed in Section 5.1.2, the primary power feed to non-class 1E switchboard panel PN07 is unaffected by a fire in area A-27. Panel PN07 supplies power from switch PN0736 to valve positioner EJHY0606. Valve positioner EJHY0606 controls the position of Train A Residual Heat Removal (RHR) discharge valve EJHCV0606 using hand controller EJHIC0606. Also, panel PN07 supplies power from switch PN0738 to temperature recorder BBTR0423. Therefore, loss of power to PN08 will have no adverse impact on PFSSD.

Cable 16RLY01GA supplies 120 VAC power to MCB RL023 miscellaneous circuits from PG20GBR217. Several loads are supplied by this power supply but only three are PFSSD components. These are FCHV0103, ABLV0050 and ABLV0052, which are main steam header to steam dump trap bypass valves. Loss of power to the solenoids associated with these valves will fail the valve open, which is not desired for PFSSD. However, a fire in area A-27 does not affect the ability to close the Main Steam Isolation Valves (MSIVs) and MSIV bypass valves using hand switch ABHS0080 in the main control room. Therefore, the MSIV downstream components can fail in an undesired position without any consequence on PFSSD.

MCC Cubicle PG20GAF4 supplies 480 VAC power to inverter PN04 (via cable 16PNG02AA). Redundant source of power to PN04 is from PK0407 (via cables 16PNK02AA and 16PNK02AB). Inverter PN04 supplies power to 120 VAC distribution panel PN410 (via cables 16PNY02AA and 16PNY02AB), which in turn supplies redundant 120 VAC power to NSSS control cabinets RP043 and RP047. For PFSSD, cabinet RP043 houses relays BGLCV0459X and BGLCV0460X, which are associated with letdown isolation valves BGLCV0459 and BGLCV0460, respectively. Cabinet RP047 includes controls for pressurizer PORVs and pressurizer spray.

A normally closed contact on relays BGLCV0459X and BGLCV0460X will open when the relay is energized following a low pressurizer level signal, causing the letdown isolation valves to close. This prevents loss of inventory through the normal letdown path if the pressurizer level is low. Loss of power to cabinet RP043 will prevent automatic closure of the letdown valves on low pressurizer level.

As discussed in Section 5.1.2, loss of the alternate source of power to RP043 and RP047, through PN03, can also occur if a fire occurs in area A-27. Therefore, a complete loss of power to RP043 and RP047 can occur if a fire occurs in this area.

Loss of power to RP043 will prevent the relays from performing their function but will not prevent PFSSD. If power is lost and the relays cannot be energized the letdown flow path can be closed by isolating air to containment using KAHIS0029 in the control room. Cables associated with KAFV0029 are unaffected by a fire in this area.

Based on the above discussion, a fire in area A-27 resulting in a loss of MCC PG20G will not impact the ability to achieve and maintain safe shutdown.

References: E-15000, XX-E-013, E-11PG20, E-11PG21, E-13AB18, E-13BG10, E-13BG35, E-13PG04, E-13PN01, E-13RL07, E-13SC12, E-1F9421, E-1R1421, J-200-00121, DCP 13324

5.1.4 125VDC Non-Class 1E Distribution Switchboard PK51 (Separation Group 5)

Switchboard PK51 supplies power to a number of PFSSD components. Cables supplying power to PK51 are run through area A-27 and could be damaged by a fire, resulting in the loss of power to PK51 and associated PFSSD loads. Cables 15PKK01AL and 15PKK01AM supply 125VDC power to PK5100 from 125VDC bus PK01. These cables are run on the North end of the area from the Communications Corridor to PK51. There are five breakers associated with PFSSD components on PK51. These are PK5113, PK5117, PK5123, PK5126 and PK5129. The consequences due to loss of power to these breakers is discussed below.

Breaker PK5113 supplies power to panel RP060 via cable 15RPK09RA. The PFSSD function of RP060 is to allow isolation of off-site power to NB01 and NB02 in the event of a fire in areas C-9 and C-10, respectively. Loss of power to RP060 will not adversely impact the ability to achieve and maintain PFSSD in the event of a fire in area A-27.

Breaker PK5117 supplies power to several non-safety components on panel RL001/RL002 via cable 15RLK01AA. Some of these components are credited for PFSSD. Those components are BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B and BGHV8149C.

Valves BGLCV0459 and BGLCV0460 are letdown isolation valves. Either valve is required to be closed for PFSSD. Loss of power to PK5117 will de-energize the associated control solenoid and fail the valves closed, which is the desired PFSSD position.

Valves BGHV8149A, BGHV8149B and BGHV8149C are letdown orifice isolation valves. Loss of power to PK5117 will de-energize the associated control solenoid and fail the valves closed, which is the desired PFSSD position.

Breaker PK5123 supplies power to steam generator blowdown control panel BM157 located in the Radwaste control room. The steam generator blowdown panel (BM157) is used as an alternate means for isolating steam generator blowdown. The normal means uses hand switches located on RL024 in the main control room. Loss of power to BM157 will de-energize solenoid valves associated with BMHV0001, BMHV0002, BMHV0003 and BMHV0004 and will fail the valves closed, which is the desired PFSSD position.

Breaker PK5126 supplies power, via cable 15RPK09NA, to relay 95XGK07 in relay rack RP330, as well as other non-PFSSD relays. Relay 95XGK07 is the automatic fire signal isolation relay for SGK05A. This relay is normally energized and, upon loss of power, SGK05A

will shut down. Power to the relay will be lost if a fire detection signal in any one of the Train A Halon protected Class 1E electrical switchgear rooms is received or damage to breaker PK5126 or cable 15RPK09NA occurs. Also, an intra-cable short in cables 16KCQ21FA and 16KCQ21JA will cause a false fire detection signal, initiate Halon release and shut down SGK05A. A fire in area A-27 could also damage cable 15GKK31CA, causing a loss of power to relay 95XGK07 and subsequent shutdown of SGK05A. If power to relay 95XGK07 is lost, operators can bypass the spurious shutdown signal by placing GKHS0101 on RP068 in BYPASS then rotate GKHIS0100 to the RUN position.

Breaker PK5129 supplies power to auxiliary relay rack RP211 via cable 15RPK09EA. The only PFSSD relay within RP211 is 3XBM46, which is the blowdown and sample process isolation signal relay. This relay is normally de-energized, so loss of power to this relay will not affect PFSSD.

Based on the above discussion, a fire in area A-27 that affects 125VDC Non-Class 1E Distribution Switchboard PK51 will not impact the ability to achieve and maintain safe shutdown.

References: E-15000, XX-E-013, E-11PK01, E-13BG10, E-13BG40, E-13BM16, E-13EG16, E-13GK13, E-13GK13A, E-13GK31, E-13KC21, E-13RL01, E-13RL02, E-13RP09, E-1R1421, M-12BG03

5.1.5 125VDC Non-Class 1E Distribution Switchboard PK52 (Separation Group 6)

Cables supplying power to PK52 are run through area A-27 and could be damaged by a fire, resulting in a loss of power to PK52 and associated PFSSD loads. Cables 16PKK02AN and 16PKK02AP supply 125VDC power to PK5200 from 125VDC bus PK02. There is one breaker (PK5213) associated with PFSSD components on PK52. The consequences due to loss of power to this breaker is discussed below.

Breaker PK5213 supplies power to reverse isolation relay rack RP331. This relay rack houses two relays (3XEG08 and 95XGK08) used for PFSSD. Relay 3XEG08 is the CCW heat exchanger B temperature valve (EGTV0030) auxiliary relay. Power to this relay originates from RL019/RL020 and is unaffected by a fire in area A-27.

Relay 95XGK08 is the automatic fire signal isolation relay for SGK05B. This relay is normally energized and, upon loss of power, SGK05B will shut down. Power to the relay will be lost if a fire detection signal in any one of the Train B Halon protected Class 1E electrical switchgear rooms is received or damage to breaker PK5213 or cable 16RPK09PA occurs. Also, an intra-cable short in cables 16KCQ21EA and 16KCQ21HA will cause a false fire detection signal, initiate Halon release and shut down SGK05B. A fire in area A-27 could also damage cables 16GKK31DA and 16GKK31DB, causing a loss of power to relay 95XGK08 and subsequent shutdown of SGK05B. If power to relay 95XGK08 is lost, operators can bypass the spurious shutdown signal by placing GKHS0104 on RP068 in BYPASS then rotate GKHIS0103 to the RUN position.

Based on the above discussion, a fire in area A-27 affecting 125VDC Non-Class 1E Distribution Switchboard PK52 will not impact the ability to achieve and maintain safe shutdown.

References: E-15000, XX-E-013, E-11PK02, E-13EG16, E-13GK13, E-13GK13A, E-13GK31, E-13KC21, E-13RL05, E-13RP09, E-1R1421

5.1.6 125VDC Non-Class 1E Distribution Switchboard PK61 (Separation Group 5)

Cables supplying power to PK61 are run through area A-27 and could be damaged by a fire, resulting in a loss of power to PK61 and associated PFSSD loads. Cables 15PKK01AJ and 15PKK01AW supply 125VDC power to PK6100 from 125VDC bus PK01. These cables are run on the North end of the area from the Communications Corridor to PK61. There are five breakers associated with PFSSD components on PK61. These are PK6106, PK6107, PK6108, PK6115, and PK6116. The consequences due to loss of power to these breakers is discussed below.

Breaker PK6106 supplies control power to MA104E via cables 15MRK10AB and 15MRK10AC. Loss of power to MA104E would cause a loss of fault protection for the startup transformer but would not cause the transformer to trip. Loss of power would annunciate on RK045C2. Consequently, loss of power to this breaker will not impact PFSSD.

Breaker PK6108 supplies control power to MA104F via cable 15NBK10AA. Loss of power to MA104F would cause a loss of fault protection for ESF transformer XNB01 but would not cause the transformer to trip. Loss of power would annunciate on RK045C2. Consequently, loss of power to this breaker will not impact PFSSD.

Breaker PK6115 supplies power to panel RL013/RL014 via cable 15RLK01CA. The PFSSD function of RL013/RL014 is to allow isolation of off-site power to NB01 and NB02 in the event of a fire in areas C-9 and C-10, respectively. Loss of power to RL013/RL014 will not adversely impact the ability to achieve and maintain PFSSD in the event of a fire in area A-27.

Breaker PK6116 supplies power to a number of 125VDC loads on RL017/RL018 via cable 15RLK01DA. The only PFSSD load supplied by PK6116 is the control solenoid for valve EMHV8882. Valve EMHV8882 is the boron injection downstream test line and is required to be closed for PFSSD. De-energizing the control solenoid closes EMHV8882. Therefore, loss of power to the solenoid will not impact PFSSD.

A fire in area A-27 affecting 125VDC Non-Class 1E Distribution Switchboard PK61 will not impact the ability to achieve and maintain safe shutdown.

References: E-15000, XX-E-013, E-11PK01, E-13MR10, E-13NB10, E-13RL04

5.1.7 Reactor Trip Switchgear Cabinets SB102A and SB102B

Both trains of reactor trip switchgear are located in fire area A-27. There is no physical separation between the two cabinets. A fire in this area could damage both trains of switchgear and associated cables such that the reactor cannot be tripped using SBHS0001 or SBHS0042 in the control room.

Cables 11SBS10AB, 11SBS12AC, 14SBS10BB and 14SBS12BC are associated with the reactor trip switchgear and are run through area A-27. Damage to any of these cables could prevent tripping the reactor from the control room.

If the reactor does not trip automatically or manually using SBHS0001 or SBHS0042, it will be necessary to insert the control rods by de-energizing rod drive motor generators SF001 and SF002. Breakers PG1902 and PG2002 supply 480 VAC power to SF001 and SF002, respectively. However, these breakers are only locally controlled. Breakers PG1901 and PG2001 are the feeder breakers for PG19 and PG20, respectively. Breaker PG1901 is located in fire area A-8. However, control power for this breaker is from PK6101 which is located in fire area A-27 and could be affected by the fire. Therefore, PG1901 may not respond to an open signal from control room hand switch PGHIS0016. Load center PG20 is located in fire area A-27 so PG2001 may not open in response to a signal from control room hand switch PGHIS0018.

In order to de-energize the rod drive motor generators, breakers PA0106 and PA0207 can be opened. These breakers are located in the turbine building and are unaffected by a fire in area A-27. Control power for PA0106 and PA0207 is from PK4103 and PK6204, respectively, which are located in the Turbine Building. Control circuits associated with PA0106 and PA0207 are unaffected by a fire in area A-27. Control power cables are unaffected by a fire in area A-27. Therefore, PA0106 and PA0207 can be opened using hand switches PGHIS0002 and PGHIS0003, respectively, located on RL016.

Opening PA0106 will de-energize load centers PG15, PG17 and PG19. Opening PA0207 will de-energize load centers PG14, PG18, PG20 and PG24. These load centers are not credited for a fire in area A-27 so loss of power will not adversely affect PFSSD in the event of a fire in this area.

Based on the above discussion, a fire in area A-27 involving reactor trip switchgear cabinets SB102A and SB102B will not prevent PFSSD. Diverse means are available to trip the reactor in the event the reactor cannot be manually tripped from the control room. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-11NK01, E-13PA14, E-13PG10, E-13PG11, E-13PG13, E-13SB10, E-13SB12A, E-13SB12B, E-13SF21

5.1.8 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A/B, and SENY0061A/B.

Source range monitor SENY0060A/B and associated cables are located in fire area A-27. Also, cables for SENE0031 and SENE0032 run through area A-27. A fire in area A-27 could cause source range monitors SENY0060A/B, SENE0031 and SENE0032 to be inoperable. Source range monitor SENE0061A/B is available to provide source range monitoring and is unaffected by a fire in area A-27.

A fire in area A-27 can use SENY0061A/B for source range monitoring.

For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013, Attachment 3.

References: E-15000, XX-E-013, E-13SE01, E-13SE02, E-13SE07

5.2 PFSSD CABLE EVALUATION

Table A-27-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-27. The applicable evaluation section is also listed in Table A-27-4.

Table A-27-4
PFSSD Cables Located in Fire Area A-27

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BBK30CA	1403	BBHV8002A	C	5.2.1	Head Vent Valve
11BBK40AG	1403	BBPCV0455A	C	5.1.1	Pressurizer PORV
11BBK40AJ	1403	BBPCV0455A	C	5.1.1	Pressurizer PORV
11BBK40AK	1403	BBPCV0455A	C	5.1.1	Pressurizer PORV
11BBK40AL	1403	BBPCV0455A	C	5.1.1	Pressurizer PORV
11BBK40AM	1403	BBPCV0455A	C	5.1.1	Pressurizer PORV
11BBK40AN	1403	BBPCV0455A	C	5.1.1	Pressurizer PORV
11BGK48CB	1403	BGHV8153A	C	5.2.2	Excess Letdown Isolation Valve
11EGB01AA	1403	DPEG01A	P	5.2.3	CCW Pump A power
11EGB01CA	1403	DPEG01C	P	5.2.3	CCW Pump C power
11SBS10AB	1403	SB102A	P	5.1.7	Power from NK04116 to SB102A
11SBS12AC	1403	SB102A	C	5.1.7	Control for reactor trip switchgear from RL003
11SES01BB	1403	SE0031	I	5.1.8	Source Range Monitor
11SES01BC	1403	SE0031	I	5.1.8	Source Range Monitor
11SES07AC	1403	SENY0060A/B	I	5.1.8	Source Range Monitor
11SES07AD	1403	SENY0060A/B	I	5.1.8	Source Range Monitor
11SES07AE	1403	SENY0060A/B	I	5.1.8	Source Range Monitor
11SES07BA	1403	SENY0060A/B	I	5.1.8	Source Range Monitor
11SES07BB	1403	SENY0060A/B	I	5.1.8	Source Range Monitor
11SES07CA	1403	SENY0060A/B	I	5.1.8	Source Range Monitor
12ABI20FE	1403	ABPV0002	C	5.2.9	Steam Generator B ARV
12ABI20FG	1403	ABPV0002	C	5.2.9	Steam Generator B ARV
12ABI20FH	1403	ABPV0002	C	5.2.9	Steam Generator B ARV

Table A-27-4
PFSSD Cables Located in Fire Area A-27

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12ABI20FK	1403	ABPV0002	C	5.2.9	Steam Generator B ARV
12ABI21KA	1403	ABPT0515	I	5.2.10	Steam Generator A PT
12ABI21NA	1403	ABPT0525	I	5.2.10	Steam Generator B PT
12ABI21SA	1403	ABPT0535	I	5.2.10	Steam Generator C PT
12ABI21VA	1403	ABPT0545	I	5.2.10	Steam Generator D PT
12ABK01AE	1403	ABHV0005	C	5.2.11	Main Steam Loop 2 to TDAFW Pump
12ABK01AF	1403	ABHV0005	C	5.2.11	Main Steam Loop 2 to TDAFW Pump
12ABK01BE	1403	ABHV0006	C	5.2.11	Main Steam Loop 3 to TDAFW Pump
12ABK01BF	1403	ABHV0006	C	5.2.11	Main Steam Loop 3 to TDAFW Pump
12AEI08EB	1403	AELT0519	I	5.2.12	SG A Narrow Range Level Transmitter
12AEI08FB	1403	AELT0549	I	5.2.12	SG D Narrow Range Level Transmitter
12AEI08GB	1403	AELT0502	I	5.2.12	SG B Wide Range Level Transmitter
12AEI12BB	1403	AELT0552	I	5.2.12	SG B Narrow Range Level Transmitter
12AEI12CB	1403	AELT0553	I	5.2.12	SG C Narrow Range Level Transmitter
12ALI07KD	1403	ALPT0026	I	5.2.11	TDAFP Suction Pressure
12ALI07KE	1403	ALPT0026	I	5.2.11	TDAFP Suction Pressure
12ALI08BA	1403	ALPT0038	I	5.2.13	ESFAS Low Suction Pressure
12BBI15EB	1403	BBTE0413B	I	5.2.14	RCS Cold Leg Loop 1 Temperature Element
12BBI15HB	1403	BBTE0423B	I	5.2.14	RCS Cold Leg Loop 2 Temperature Element
12BBI15JB	1403	BBTE0443A	I	5.2.14	RCS Hot Leg Loop 4 Temperature Element
12BBI15KB	1403	BBTE0433A	I	5.2.14	RCS Hot Leg Loop 3 Temperature Element
12BBI15NB	1403	BBPT0403	I	5.2.15	RCS Wide Range Hot Leg Pressure

Table A-27-4
PFSSD Cables Located in Fire Area A-27

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12BBI16LB	1403	BBPT0456	I	5.1.1 5.2.10	Pressurizer Pressure Transmitter
12BBI16QB	1403	BBLT0460	I	5.2.16	Pressurizer level indication
12FCK23AR	1403	FCHV0312	P	5.2.11	TDAFW Pump Trip and Throttle Valve
12FCK23AS	1403	FCHV0312	C	5.2.11	TDAFW Pump Trip and Throttle Valve
12FCK23AU	1403	FCHV0312	P	5.2.11	TDAFW Pump Trip and Throttle Valve
12FCK24AK	1403	FCFV0313	I	5.2.11	TDAFW Pump Speed-Governing Valve
12FCK24AQ	1403	FCFV0313	I	5.2.11	TDAFW Pump Speed-Governing Valve
12GNI05BA	1403	GNPT0936	I	5.2.10	Containment Pressure Transmitter
12RPK09AA	1403	RP266	P	5.2.11	Auxiliary Relay Panel
12RPK15AA	1403	86XRP1	P	5.2.17	Control Room Lock Out Relay
12RPK15BA	1403	86XRP2	P	5.2.17	Control Room Lock Out Relay
12RPK15CA	1403	86XRP3	P	5.2.17	Control Room Lock Out Relay
12SAZ23AA	1403	ABHV0005	C	5.2.11	Main Steam Loop 2 to TDAFW Pump
12SAZ23BA	1403	ABHV0006	C	5.2.11	Main Steam Loop 3 to TDAFW Pump
12SES02BB	1403	SE0032	I	5.1.8	Source Range Monitor
12SES02BC	1403	SE0032	I	5.1.8	Source Range Monitor
13ABI20GA	1403	ABPV0003	C	5.2.9	Steam Generator C ARV
13ABI20GC	1403	ABPV0003	C	5.2.9	Steam Generator C ARV
13ABI20GD	1403	ABPV0003	C	5.2.9	Steam Generator C ARV
13ABI20GE	1403	ABPV0003	C	5.2.9	Steam Generator C ARV
13ABI21PA	1403	ABPT0526	I	5.2.10	Steam Generator B PT
13ABI21TA	1403	ABPT0536	I	5.2.10	Steam Generator C PT

Table A-27-4
PFSSD Cables Located in Fire Area A-27

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
13AEI08GB	1403	AELT0503	I	5.2.12	SG C Wide Range Level Transmitter
13AEI08HB	1403	AELT0518	I	5.2.12	SG A Narrow Range Level Transmitter
13AEI08JB	1403	AELT0528	I	5.2.12	SG B Narrow Range Level Transmitter
13AEI08KB	1403	AELT0538	I	5.2.12	SG C Narrow Range Level Transmitter
13AEI08LB	1403	AELT0548	I	5.2.12	SG D Narrow Range Level Transmitter
13BBI16MB	1403	BBPT0457	I	5.1.1 5.2.10 5.2.30	Pressurizer Pressure Transmitter
13GNI05CA	1403	GNPT0935	I	5.2.10	Containment Pressure Transmitter
14ABK23FA	1403	ABHY0012B	C	5.2.19	Loop 4 MSIV By-Pass Solenoid Valve
14ABK23FB	1403	ABHY0015B	C	5.2.19	Loop 1 MSIV By-Pass Solenoid Valve
14ABK23FC	1403	ABHY0018B	C	5.2.19	Loop 2 MSIV By-Pass Solenoid Valve
14ABK23FD	1403	ABHY0021B	C	5.2.19	Loop 3 MSIV By-Pass Solenoid Valve
14ABK23FE	1403	ABHV0012, 15, 18, 21	C	5.2.19	MSIV Bypass Valves
14ABK23FF	1403	ABHS0079	C	5.2.19	MSIV & MSIV Bypass Valves Handswitch
14ABK23FG	1403	ABHV0012, 15, 18, 21	C	5.2.19	MSIV Bypass Valves
14AEI08LB	1403	AELT0504	I	5.2.12	SG D Wide Range Level Transmitter
14AEI08NB	1403	AELT0517	I	5.2.12	SG A Narrow Range Level Transmitter
14AEI08PB	1403	AELT0527	I	5.2.12	SG B Narrow Range Level Transmitter
14AEI08QB	1403	AELT0537	I	5.2.12	SG C Narrow Range Level Transmitter
14AEI08RB	1403	AELT0547	I	5.2.12	SG D Narrow Range Level Transmitter
14BBG04AA	1403	BBHV8351A	P	5.2.20	RCP Seal Injection
14BBG04AB	1403	BBHV8351A	C	5.2.20	RCP Seal Injection

Table A-27-4
PFSSD Cables Located in Fire Area A-27

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BBG04BA	1403	BBHV8351B	P	5.2.20	RCP Seal Injection
14BBG04BB	1403	BBHV8351B	C	5.2.20	RCP Seal Injection
14BBG04CA	1403	BBHV8351C	P	5.2.20	RCP Seal Injection
14BBG04CB	1403	BBHV8351C	C	5.2.20	RCP Seal Injection
14BBG04DA	1403	BBHV8351D	P	5.2.20	RCP Seal Injection
14BBG04DB	1403	BBHV8351D	C	5.2.20	RCP Seal Injection
14BBG12AC	1403	BBPV8702A	C	5.2.15	RCS to RHR Pump A Suction
14BBG12AF	1403	BBPV8702A	C	5.2.15	RCS to RHR Pump A Suction
14BBG12AG	1403	BBPV8702A	C	5.2.15	RCS to RHR Pump A Suction
14BBG12BF	1403	BBPV8702B	C	5.2.15	RCS to RHR Pump B Suction
14BBG12BG	1403	BBPV8702B	C	5.2.15	RCS to RHR Pump B Suction
14BBG39BC	1403	BBHV8000B	C	5.1.1	Pressurizer PORV Block Valve
14BBG39BF	1403	BBHV8000B	C	5.1.1	Pressurizer PORV Block Valve
14BBG39BJ	1403	BBHV8000B	C	5.1.1	Pressurizer PORV Block Valve
14BBI16BA	1403	BBPT0406	C	5.2.21	RCS Pressure Indication
14BBI16NB	1403	BBPT0458	I	5.1.1 5.2.10	Pressurizer Pressure Transmitter
14BBK30BA	1403	BBHV8001B	C	5.2.1	Head Vent Valve
14BBK30DA	1403	BBHV8002B	C	5.2.1	Head Vent Valve
14BBK40BK	1403	BBPCV0456A	C	5.1.1	Pressurizer PORV
14BBK40BL	1403	BBPCV0456A	P	5.1.1	Pressurizer PORV
14BBK40BM	1403	BBPCV0456A	C	5.1.1	Pressurizer PORV
14BBK40BN	1403	BBPCV0456A	P	5.1.1	Pressurizer PORV

Table A-27-4
PFSSD Cables Located in Fire Area A-27

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BGI51BA	1403	BGFT0215B	I	5.2.20	RCP Seal Total Flow Transmitter
14BGK48AB	1403	BGHV8153B	C	5.2.2	Excess Letdown Isolation Valve
14BGK48BB	1403	BGHV8154B	C	5.2.2	Excess Letdown Isolation Valve
14BMK06AC	1403	BMHV0001	C	5.2.23	SG A to Blowdown Flash Tank Isolation Valve
14BMK06BC	1403	BMHV0002	C	5.2.23	SG B to Blowdown Flash Tank Isolation Valve
14BMK06CC	1403	BMHV0003	C	5.2.23	SG C to Blowdown Flash Tank Isolation Valve
14BMK06DC	1403	BMHV0004	C	5.2.23	SG D to Blowdown Flash Tank Isolation Valve
14BNI07FA	1403	BNLT0933	I	5.2.18	RWST Level Transmitter
14EFG07BC	1403	EFHV0032	C	5.2.24	Service Water to Train B Containment Coolers
14EFG08BC	1403	EFHV0050	C	5.2.24	Service Water to Train B Containment Coolers
14EFG09BC	1403	EFHV0034	C	5.2.24	Service Water to Train B Containment Coolers
14EFG09DC	1403	EFHV0046	C	5.2.24	Service Water to Train B Containment Coolers
14EGG07BA	1403	EGHV0102	P	5.2.5	CCW To RHR Heat Exchanger B Isolation Valve
14EGG07BB	1403	EGHV0102	C	5.2.5	CCW To RHR Heat Exchanger B Isolation Valve
14EGG10AC	1403	EGHV0062	C	5.2.6	CCW Return from RCP Thermal Barrier
14EGG10AD	1403	EGHV0062	C	5.2.6	CCW Return from RCP Thermal Barrier
14EGG18BC	1403	EGHV0127	C	5.2.6	CCW HX Out to RCS Bypass Isolation
14EGG18BD	1403	EGHV0127	C	5.2.6	CCW HX Out to RCS Bypass Isolation
14EGG18DC	1403	EGHV0133	C	5.2.6	EGHV0061 Bypass Valve
14EGG18DD	1403	EGHV0133	C	5.2.6	EGHV0061 Bypass Valve
14EGI13BA	1403	EGPT0078	I	5.2.7	CCW Pumps B and D Discharge Pressure
14EGK16BA	1403	EGTV0030/EGTY0030A	C	5.2.8	CCW Heat Exchanger B Bypass Isolation
14EJG06BC	1403	EJHV8811B	C	5.2.18	Containment Sump Isolation Valve

Table A-27-4
PFSSD Cables Located in Fire Area A-27

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EJG09AC	1403	EJHV8840	C	5.2.15	RHR to RCS Hot Leg Loops 2 and 3
14EJG09AD	1403	EJHV8840	C	5.2.15	RHR to RCS Hot Leg Loops 2 and 3
14EJG09BC	1403	EJHV8809B	C	5.2.15	RHR to RCS Cold Leg Loops 3 and 4
14EJG09BD	1403	EJHV8809B	C	5.2.15	RHR to RCS Cold Leg Loops 3 and 4
14EMK04CA	1403	EMHV8843	C	5.2.25	Boron Injection Upstream Test Line
14EMK04EA	1403	EMHV8871	C	5.2.25	SI Test Line from BIT
14ENG03BC	1403	ENHV0012	C	5.2.10	Containment Spray Isolation Valve
14ENG03BD	1403	ENHV0012	C	5.2.10	Containment Spray Isolation Valve
14EPG02CE	1403	EPHV8808B	C	5.2.26	Accumulator Tank B Isolation Valve
14EPG02DE	1403	EPHV8808D	C	5.2.26	Accumulator Tank D Isolation Valve
14GLG06BA	1403	DSGL11B	P	5.2.3	Train B CCW Pumps B and D Room Cooler
14GLG06BC	1403	DSGL11B	C	5.2.3	Train B CCW Pumps B and D Room Cooler
14GNG02BD	1403	DSGN01B	C	5.2.24	Train B Containment Cooler
14GNG02BH	1403	DSGN01B	C	5.2.24	Train B Containment Cooler
14GNG02DD	1403	DSGN01D	C	5.2.24	Train B Containment Cooler
14GNG02DH	1403	DSGN01D	C	5.2.24	Train B Containment Cooler
14NBB14AD	1403	NB0209	C	5.2.27	Off-site power feeder breaker to class 1E 4160 VAC switchgear NB02
14PNG01AE	1403	PN08	P	5.1.3	RL017/RL018 Power
14RPK09AA	1403	RP210	P	5.2.23	Isolation relay enclosure for BMHV1, 2, 3 and 4
14SBS10BB	1403	SB102B	P	5.1.7	Power from NK05410 to SB102B
14SBS12BC	1403	SB102B	C	5.1.7	Control for reactor trip switchgear from RL003
15BBA01AC	1403	DPBB01A	C	5.2.29	Reactor Coolant Pump A Motor

Table A-27-4
PFSSD Cables Located in Fire Area A-27

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15BBA01BC	1403	DPBB01B	C	5.2.29	Reactor Coolant Pump B Motor
15BMK16AA	1403	BM157	P	5.1.4	Power from PK5123 to BM157
15GKK31CA	1403	SGK05A	C	5.1.4	Fire signal isolation
15MRK10AB	1403	MA104E	P	5.1.6	Conductor N from PK6106 to MA104E
15MRK10AC	1403	MA104E	P	5.1.6	Conductor P from PK6106 to MA104E
15NBA10AA	1403	XNB01	C	5.2.22	NB0112 Lockout Relay 286-1/T1
15NBB03AJ	1403	XNB01	P	5.2.22	XNB01 Phase Differential Relay 287/T1
15NBK10AA	1403	MA104F	P	5.1.6	Control power to MA104F
15PGA10AA	1403	PA0105	C	5.2.28	Load Centers PG11, PG13 and PG25 Fdr Bkr
15PGA10BA	1403	PA0106	C	5.1.2	Load Centers PG15, PG17 and PG19 Fdr Bkr
15PGA10BB	1403	PA0106	C	5.1.2	Load Centers PG15, PG17 and PG19 Fdr Bkr
15PGG02AF	1403	PG19G	P	5.1.2	480V power from PG019
15PGG02AX	1403	PG19G	P	5.1.2	480V power from PG019
15PGG13DC	1403	PG1901	C	5.1.2	Bus PG19 Feeder Breaker
15PKK01AJ	1403	PK61	P	5.1.6	Conductor 6P from PK0106 to PK6100
15PKK01AL	1403	PK51	P	5.1.4	Conductor 12P from PK0112 to PK5100
15PKK01AM	1403	PK51	P	5.1.4	Conductor 12N from PK0112 to PK5100
15PKK01AW	1403	PK61	P	5.1.6	Conductor 6N from PK0106 to PK6100
15PNG02AA	1403	PN03	P	5.1.2	480 VAC Power from PG19GCF3
15PNK02AA	1403	PN03	P	5.1.2	(+)125 VDC Power form PK0105
15PNK02AB	1403	PN03	P	5.1.2	(-)125 VDC Power form PK0105
15PNY01AR	1403	XPN07D	P	5.1.2	Alternate feed to PN07 from PG19GGFR3
15PNY02AA	1403	PN310	P	5.1.2	120 VAC Power from PN03 (Hot Side)

Table A-27-4
PFSSD Cables Located in Fire Area A-27

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15PNY02AB	1403	PN310	P	5.1.2	120 VAC Power from PN03 (Neutral)
15RLK01AA	1403	RL001/RL002	P	5.1.4	Power from PK5117 to RL001/RL002 misc ckts
15RLK01CA	1403	RL013/RL014	P	5.1.6	125VDC Power to RL013/RL014
15RLK01DA	1403	RL017/RL018	P	5.1.6	125VDC power to RL017/RL018
15RLK01HA	1403	RL023/RL024	P	5.1.2	MCB miscellaneous power circuits
15RPK09EA	1403	RP211	P	5.1.4	Power from PK5129 to RP211
15RPK09NA	1403	RP330	P	5.1.4	Power from PK5126 to RP330
15RPK09RA	1403	RP060	P	5.1.4	Power from PK5113 to RP060
16BBA01CC	1403	DPBB01C	C	5.2.29	Reactor Coolant Pump C Motor
16BBA01DC	1403	DPBB01D	C	5.2.29	Reactor Coolant Pump D Motor
16EJI12BA	1403	EJHCV0607	P	5.2.15	RHR heat exchanger outlet control valve
16FCY35AA	1403	FC170A	P	5.2.4	Steam Generator Feed Pump B Term Cabinet
16GKK31DA	1403	SGK05B	C	5.1.5	Fire signal isolation
16GKK31DB	1403	SGK05B	C	5.1.5	Fire signal isolation
16KCQ21EA	1403	SGK05B	C	5.1.5	Fire Detection Actuation Circuit
16KCQ21FA	1403	SGK05A	C	5.1.4	Fire Detection Actuation Circuit
16KCQ21HA	1403	SGK05B	C	5.1.5	Fire Detection Actuation Circuit
16KCQ21JA	1403	SGK05A	C	5.1.4	Fire Detection Actuation Circuit
16NBA10AB	1403	XNB01	C	5.2.22	NB0212 Lockout Relay 286-2/T1
16NBA11AC	1403	XNB02	C	5.2.22	XNB02 Lockout Relay 286-1/T2
16NBA11AE	1403	XNB02	C	5.2.22	XNB02 Lockout Relay 286-2/T2
16NBB03AB	1403	XNB01	P	5.2.22	XNB01 Phase Differential Relay 287/T1
16NBB05AD	1403	XNB02	P	5.2.22	XNB02 Phase Differential Relay 287/T2

Table A-27-4
PFSSD Cables Located in Fire Area A-27

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16NBB05AL	1403	XNB02	P	5.2.22	XNB02 Phase Differential Relay 287/T2
16PGA10CA	1403	PA0206	C	5.2.28	Load Centers PG12, PG16 and PG26 Fdr Bkr
16PGA11AA	1403	PA0207	C	5.1.3	Load Centers PG14, PG18, PG20 and PG24 Fdr Bkr
16PGA11AC	1403	PA0207	C	5.1.3	Load Centers PG14, PG18, PG20 and PG24 Fdr Bkr
16PGA11AE	1403	PA0207	C	5.1.3	Load Centers PG14, PG18, PG20 and PG24 Fdr Bkr
16PGG04AB	1403	PG20G	P	5.1.3	13.8kV feeder from PG1400 to PG2400
16PGG04AC	1403	PG20G	P	5.1.3	13.8kV feeder from PG2400 to PG2000
16PGG04AQ	1403	PG20G	P	5.1.3	480VAC power to PG20G from PG20
16PGG04AR	1403	PG20G	P	5.1.3	480VAC power to PG20G from PG20
16PGG13DA	1403	PG2001	C	5.1.3	Load Center PG20 Feeder Breaker
16PGG13DC	1403	PG2001	C	5.1.3	Load Center PG20 Feeder Breaker
16PKK02AN	1403	PK52	P	5.1.5	Conductor 11P from PK0211 to PK5200
16PKK02AP	1403	PK52	P	5.1.5	Conductor 11N from PK0211 to PK5200
16PNG02AA	1403	PN04	P	5.1.3	480 VAC Power from PG20GAF4
16PNK02AA	1403	PN04	P	5.1.3	(+)125 VDC Power From PK0407
16PNK02AB	1403	PN04	P	5.1.3	(-)125 VDC Power From PK0407
16PNY01AR	1403	XPN08D	P	5.1.3	Alternate feed to PN08 from PG20GER5
16PNY02AA	1403	PN410	P	5.1.3	120 VAC Power from PN04 (Hot Side)
16PNY02AB	1403	PN410	P	5.1.3	120 VAC Power from PN04 (Neutral)
16RLY01GA	1403	RL023/RL024	P	5.1.3	MCB miscellaneous power circuits
16RPK09PA	1403	SGK05B	P	5.1.5	Fire signal isolation

5.2.1 Reactor Head Vent Valves

PFSSD requires that one of the two reactor vessel head vent valves on each flow path (2 flow paths total) be closed to prevent uncontrolled depressurization of the RCS. Circuits for three of the four head vent valves run through area A-27. These cables are listed in Table A-27-4.

Cables for head vent valve BBHV8001A are not run through A-27 and are unaffected by a fire in A-27. Therefore, the cables for redundant head vent valve BBHV8002A can be damaged without any consequences on PFSSD.

Either BBHV8001B or BBHV8002B needs to be closed to prevent RCS depressurization through the separation group 4 head vent flow path. The separation requirements of 10CFR50, Appendix R are not satisfied for valves BBHV8001B and BBHV8002B. Less than 20 feet of horizontal separation and intervening combustibles exist between raceways carrying cables 14BBK30BA and 14BBK30DA.

Cable 14BBK30BA is run in conduit through area A-27. This conduit carries one other cable (14BGK48AB) which is a control cable for excess letdown isolation valve BGHV8153B and is normally de-energized. Therefore, the possibility of an inter-cable hot short that would cause valve BBHV8001B to open is not credible. An intra-cable short in cable 14BBK30BA would not cause the valve to open because this failure mode would not energize the control solenoid. Considering a ground fault equivalent hot short (GFEHS), a short to ground involving conductor 2 in cable 14BBK30BA coincident with a short to ground involving another +125 VDC conductor in another cable supplied from the same power source could open the head vent valve. This hot short has to occur prior to an intra-cable short occurring between conductors 2 and N2 in the associated cable because an intra-cable short between these conductors coincident with a GFEHS will open the circuit protective device and de-energize the control solenoid. Fire testing (NUREG/CR-7100) has shown that intra-cable shorting in thermoset cables occurs before inter-cable or GFEHS shorting. Therefore, there is reasonable assurance that inter-cable or GFEHS shorts will not cause two valves to open if a fire occurs in this area.

Based on this discussion, there is reasonable assurance that cable damage, along with any combination of cable failures, will not cause valve BBHV8001B to spuriously open in the event of a fire in area A-27. Therefore, both head vent valve flow paths will be isolated.

References: E-15000, XX-E-013, E-1F9301, E-13BB30, E-1R1423A, M-12BB04

5.2.2 Excess Letdown Isolation Valves

PFSSD requires the excess letdown path be isolated to prevent uncontrolled depressurization of the RCS. To accomplish this, either normally closed valve BGHV8153A or BGHV8154A must be maintained closed and either normally closed valve BGHV8153B or BGHV8154B must be maintained closed. Cables associated with these valves are listed in Table A-27-4.

Circuits for BGHV8154A do not run through fire area A-27 and are unaffected by a fire in this area. Therefore, this valve remains closed.

The separation requirements of 10CFR50, Appendix R are not satisfied for valves BGHV8153B and BGHV8154B. Less than 20 feet of horizontal separation and intervening combustibles exist between raceways carrying cables 14BGK48AB and 14BGK48BB.

Cable 14BGK48AB is run in conduit through area A-27. This conduit carries one other cable (14BBK30BA) which is a control cable for RCS head vent valve BBHV8001B and is normally de-energized. Therefore, a hot short that would cause valve BGHV8153B to open is not credible.

An intra-cable short in cable 14BGK48AB would not cause the valve to open because this failure mode would not energize the solenoid.

Based on this discussion, there is reasonable assurance that valve BGHV8153B will not spuriously open in the event of a fire in area A-27.

References: E-15000, XX-E-013, E-1F9301, E-13BG48, E-1R1423A, M-12BG01

5.2.3 Component Cooling Water Pumps and Room Coolers

DPEG01A, DPEG01B, DPEG01C and DPEG01D are motors for Component Cooling Water (CCW) Pumps A (PEG01A), B (PEG01B), C (PEG01C) and D (PEG01D). PEG01A and PEG01C circulate cooling water to essential components through the Train A Component Cooling Water (CCW) heat exchanger (EEG01A). PEG01B and PEG01D circulate cooling water to essential components through the Train B Component Cooling Water (CCW) heat exchanger (EEG01B). Each CCW Pump can supply 100 percent of the required cooling water to selected Engineered Safety Features (ESF) components.

Cables 11EGB01AA and 11EGB01CA are power cables for the Train A CCW pump motors and run in cable tray through fire area A-27. A fire in area A-27 could damage these cables and prevent operation of both pump motors.

Power and control cables associated with both Train B CCW pumps are unaffected by a fire in this area.

Power and control cables for Train B CCW pump room coolers are run in tray in the far South portion of area A-27. Damage to these cables will result in the loss of room cooling for the Train B CCW pump motors. Since Train B CCW is relied on for a fire in area A-27, the Train B CCW pumps need to be operable. PIR 2000-2646 was written to document and evaluate this condition. Calculation GL-M-006 was prepared to evaluate the area temperature on the 2026'-0" elevation of the Auxiliary Building in the event of a loss of the Trains A and B CCW pump room coolers. The calculation also assumes a loss of non-safety related ventilation in the area.

Based on Calculation GL-M-006, the maximum temperature on the 2026'-0" elevation of the auxiliary building, under the conditions stated above, is 123.7°F. Each CCW pump motor is designed to operate continuously at 122°F. The PIR evaluation states that a room temperature less than 2°F higher than the operating temperature of the motor will not have a significant impact on the operation of the motor. Consequently, based on Calculation GL-M-006 and PIR 2000-2646, a loss of CCW pump room cooling will not result in a loss of CCW.

Based on the above discussion, Train A CCW may be affected but Train B CCW is available.

References: E-15000, XX-E-013, E-1F9401A, E-0R1422, E-1R1421, E-1R1423B, E-13GL06, E-13EG01C, E-13EG01D, E-13NB02, E-13NB05, M-12EG01, GL-M-006, PIR 2000-2646, E-012.2-015-04

5.2.4 Steam Generator Feedwater Pumps

Main feedwater pump steam supply valves FCFV0005 and FCFV0105 are credited in the PFSSD analysis to trip the main feedwater pumps if the main steam isolation valves (MSIVs) are affected by a fire. Closing the MSIVs stops steam flow to the feedwater pumps' turbines and stops the feedwater pumps. The steam generator feedwater pumps are tripped in the event of a fire to prevent overfilling the steam generators.

Cable 16FCY35AA provides the primary source of 120 VAC power from distribution panel PN010A to panel FC170A. The alternate source of power to panel FC170A is not credited for

PFSSD and is assumed lost. Damage to cable 16FCY35AA could cause a loss of power to FC170A and prevent energizing trip relays associated with valve FCFV0105. This would prevent closing valve FCFV0105 to stop steam flow to the B feedwater pump.

A fire in area A-27 will not affect the ability to close the MSIVs from the control room. As discussed in Section 5.2.19, MSIV all-close hand switch ABHS0079 could be affected by a fire in this area. However, all-close hand switch ABHS0080 is unaffected and can be used to close the MSIVs from the control room.

Based on the above discussion, valve FCFV0105 may not close if a fire occurs in this area. However, the MSIVs can be closed using hand switch ABHS0080 in the main control room. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-13FC35, E-1F9103, E-1F9421

5.2.5 CCW to RHR Heat Exchanger Control Valves

PFSSD requires one train of residual heat removal (RHR) to be available for shutdown cooling. The RHR system is not used for hot standby.

Valve EGHV0101 is the Train A CCW to RHR Heat Exchanger control valve. Valve EGHV0102 is the Train B CCW to RHR Heat Exchanger control valve. The valves are normally closed during power operation. PFSSD requires that the valve on the operating train of CCW be closed until shutdown cooling mode is entered, at which time the valve on the operating train of RHR needs to be open.

Cable 14EGG07BA is the power cable for valve EGHV0102. Damage to this cable could prevent operation of the valve from the control room. Cable 14EGG07BB is a control cable for valve EGHV0102. Damage to this cable could either prevent operation of the valve from the control room or bypass the limit switch, possibly causing damage to the valve motor.

Damage to either cable will not cause valve EGHV0102 to spuriously open. This valve is not a Hi/Low pressure interface valve, so consideration of a 3-phase hot short is not required. Damage to the control cable in any manner is not sufficient to spuriously open the valve.

During cold shutdown, it may be necessary to either perform a cold shutdown repair or manually open valve EGHV0102 in fire area A-16 when transitioning to RHR Train B.

References: E-15000, XX-E-013, E-1F9401A, E-13EG07, E-13EG07A, E-1R1421, M-12EG02

5.2.6 Thermal Barrier Cooling Isolation Valves

PFSSD requires isolation of the CCW system from each RCP thermal barrier whenever a fire-induced loss of all seal cooling occurs. However, as long as at least one seal cooling method (seal injection or thermal barrier cooling) is available and is unaffected by the fire, the CCW system can remain lined-up to the RCP thermal barriers with no adverse impact on PFSSD.

A fire in area A-27 may cause a loss of Train A CCW due to damage to power cables associated with the CCW pumps. Both trains of CCPs remain available. If Train A CCW is operating at the time of the fire, the Train B CCW system can be lined up from the control room.

Cables associated with EGHV0062, EGHV0127 and EGHV0133 are run in this area. Damage to cables associated with EGHV0127 and EGHV0133 will have no adverse impact because these valves are located in the bypass lines for valves EGHV0058 and EGHV0061,

respectively. Valves EGHV0058 and EGHV0061 are unaffected by a fire in this area and will remain open.

Cables 14EGG10AC and 14EGG10AD associated with EGHV0062 are run in this area. Damage to cables 14EGG10AC or 14EGG10AD could cause the valve to spuriously close, preventing CCW flow to the thermal barrier heat exchangers. Bypass valve EGHV0132 is unaffected and can be opened from the control room to restore thermal barrier cooling. Loss of thermal barrier cooling would be indicated in the control room as a reduction in flow on flow indicators EGFI0128 and EGFI0129. Therefore, operators can diagnose a loss of thermal barrier cooling.

Based on the above discussion, isolation of thermal barrier cooling is not required for a fire in area A-27. The position of the thermal barrier isolation valves has no impact on PFSSD for a fire in area A-27.

References: E-15000, XX-E-013, E-1F9303, E-13EG10, E-13EG18, E-1R1421, M-12EG03

5.2.7 Train B Component Cooling Water Pumps Pressure Transmitter

EGPT0078 is a pressure transmitter that monitors the discharge pressure on the Train B CCW pumps discharge header. A low discharge pressure will automatically start the standby pump on the associated train. PFSSD requires that the pressure transmitter on the unaffected train be available.

Cable 14EGI13BA is an instrument cable for EGPT0078 and is run in the South portion of area A-27. Damage to this cable could cause a spurious low discharge pressure signal and cause the standby pump to automatically start. The running pump will remain operating until manually stopped by an operator in the control room.

Although a spurious low discharge pressure signal could complicate PFSSD, it will not prevent PFSSD from being achieved. An operator in the control room could allow both pumps to operate or place one of the pumps in pull-to-lock while ensuring the other pump is operating using the associated hand switch in the control room. It may also be necessary to locally monitor the discharge pressure on the operating pump using the discharge pressure indicator.

A fire in area A-27 will not prevent the operation of Train B CCW pumps in the event of damage to the discharge pressure transmitter circuit. A recovery action is available to ensure operation of either Train B CCW pump. With the availability of Train B CCW assured, no E-1F9900 OMA is required to achieve and maintain hot standby.

References: E-15000, XX-E-013, E-1R1421, E-13EG01C, E-13EG01D, E-13EG13, E-13RP08, M-12EG01.

5.2.8 Component Cooling Water Train B Heat Exchanger Bypass Isolation Valve

EGTV0030 is the bypass isolation valve for the Train B CCW heat exchanger. This valve is air operated using solenoid valve EGTY0030A. With solenoid valve EGTY0030A energized (normal state), valve EGTV0030 is automatically modulated to maintain required CCW heat exchanger outlet temperature. Loss of power to the solenoid will fail valve EGTV0030 closed, which is the desired PFSSD position.

Cable 14EGK16BA is associated with valve EGTV0030 and is run in tray the South portion of fire area A-27. An external (inter-cable) +125VDC hot short across conductor 11 will cause the solenoid to energize and permit modulation, regardless of the position of the hand switch. An open in this cable will de-energize the solenoid and close the valve, which is the desired PFSSD position.

Valve modulation is controlled mechanically by temperature detector EGTIC0030. The temperature detector is located adjacent to the CCW heat exchanger. The temperature detector monitors outlet temperature of the CCW heat exchanger and adjusts air pressure to the temperature control valve (EGTV0030) accordingly. This controls the amount of water that bypasses the CCW heat exchanger to maintain outlet temperature at the desired level. Therefore, valve modulation will not affect PFSSD.

A fire in area A-27 will not adversely affect the ability of valve EGTV0030 to perform its intended function. The valve will either modulate, as designed, or close in response to a control room signal.

References: E-15000, XX-E-013, E-13EG16, E-1R1421, M-12EG02

5.2.9 Steam Generator Atmospheric Relief Valves

Cables associated with Steam Generator Atmospheric Relief Valves ABPV0002 and ABPV0003 are run in area A-27. Cables associated with Steam Generator Atmospheric Relief Valves ABPV0001 and ABPV0004 are not run in area A-27.

PFSSD requires at least two steam generator atmospheric relief valves (ARV) be controlled and the other two closed. The ARVs are normally closed and require air pressure to open. Each valve is controlled by a pressure transmitter input signal from a pressure transmitter installed on the outlet side of the steam generator. The relief valve opens when the pressure reaches a designated set point.

Because of the fail-close design of the valve, it is unlikely that spurious signals due to cable damage will cause the valves to open. In the unlikely event the valves open, air pressure can be removed by closing appropriate air and nitrogen supply valves to fail close the valves. These valves are not located in area A-27 and access to the valves can be gained without having to traverse area A-27.

Damage to the associated cables could prevent controlling two of the four ARVs from the control room. The PFSSD methodology in area A-27 uses steam generators A and D to cool down. Local controllers ABFHC0002 and ABFHC0003, located in fire area A-23, can be used to close ARVs ABPV0002 and ABPV0003, respectively. ARVs ABPV0001 and ABPV0004 would be available to control cooldown using steam generators A and D, respectively.

Based on the above discussion, manual actions are available to ensure a fire in area A-27 will not prevent the control of two Steam Generator Atmospheric Relief Valves and the closure of the remaining two.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-1F9101, E-13AB20A, E-13AB20B, E-1R1423A, E-1R1423B, M-12AB01

5.2.10 Safety Injection and Containment Spray

Calculation XX-E-013, Appendix 1 (PFSSD Support Section) provides a detailed discussion about the potential PFSSD impact of a spurious safety injection signal (SIS) and spurious containment spray actuation signal (CSAS). This section discusses the specific PFSSD impact if a fire occurs in this area.

Cables associated with GNPT0935 and GNPT0936 are run in area A-27. Cables associated with GNPT0934 and GNPT0937 are not run in area A-27. A fire in area A-27 could cause a spurious SIS and CSAS due to damage to cables associated with at least two pressure transmitters causing a spurious high containment pressure signal.

Cables associated with Train B containment spray isolation valve ENHV0012 are run in area A-27. Damage to these cables could cause the valve to spuriously open. However, as described below, a spurious CSAS can be mitigated from the control room. Therefore, spurious opening of this valve will not adversely impact PFSSD.

Cables associated with BBPT0456, BBPT0457 and BBPT0458 are run in area A-27. Cables associated with BBPT0455 are not run in area A-27. A fire in this area could cause a spurious SIS due to damage to cables associated with two of the four pressurizer pressure transmitters causing a spurious low pressurizer pressure signal.

Cables associated with steam line pressure transmitters ABPT0515, ABPT0525, ABPT0526, ABPT0535, ABPT0536 and ABPT0545 are run in area A-27. Consequently, a fire in area A-27 could cause a spurious SIS due to damage to cables associated with two out of three steam line pressure transmitters on loops 2 and 3.

A spurious SIS starts the charging sequence which starts the CCPs and opens the BIT flowpath valves. For a fire in this area, Train B CCP is credited for PFSSD since a number of Train A PFSSD components could be lost. Train B BIT flowpath valves EMHV8801B and EMHV8803B are unaffected and would open on a SIS. The Train B RWST to CCP suction header valve BNLCV0112B is unaffected and would open on a SIS. Also, Train B CCP mini flow valve BGHV8111 is unaffected and Train B CCW flow to the seal water heat exchanger is unaffected to ensure cooling of the recirc flow and RCP seal return. Train B CCW flow is also available to the Train B CCP oil cooler. Therefore, the Train B charging pump will not be affected by a spurious SIS caused by a fire in this area.

A start of the credited CCW system (Train B) will not adversely impact the system. The Train B ESW system is unaffected and will start on a spurious SIS, providing necessary cooling water to the CCW heat exchanger.

A start of the AFW pumps will not adversely impact PFSSD. The Train B AFW pump is credited for a fire in this area. Suction from the CST to the Train B AFW pump is unaffected. Discharge flow will either return to the CST or flow to the steam generators through the discharge control valves. Therefore, the Train B AFW pump is unaffected by a spurious SIS caused by a fire in this area.

A spurious SIS will start both RHR pumps. Train A RHR from RWST supply valve BNHV8812A is unaffected and will open. Train A RHR miniflow switch EJFIS0610 and miniflow valve EJFCV0610 are unaffected and EJFCV0610 will open on low flow in the RHR system. Train A CCW system could be affected per Section 5.2.3, which would prevent CCW flow to the Train A RHR heat exchanger. However, this will not cause damage to the RHR pump because CCW only flows to the RHR heat exchanger on a SIS coincident with low level in the RWST. The recirc flow combined with the supply from the RWST will ensure that the Train A RHR pump will not be damaged and gives operators time to stop the pump after the spurious SIS is terminated. Calculation EJ-M-018 shows there is 2 ½ hours available to stop the RHR pumps when flowing on recirculation only with no CCW flow to the RHR heat exchanger.

A spurious Containment Spray Actuation Signal (CSAS) due to spurious high containment pressure can be mitigated by placing CS pump control hand switches ENHIS0003 and

ENHIS0009 in pull-to-lock. These switches are located on control room panel RL017. Indication in the Control Room for SI and CS pump operation is unaffected by a fire in A-27.

Based on the above discussion, a fire in area A-27 could cause a spurious SIS due to low steamline pressure, low pressurizer pressure and high containment pressure. A fire in A-27 could also cause a spurious CSAS due to high containment pressure. The spurious SIS and CSAS will not cause damage to credited hot standby or cold shutdown equipment.

References: E-15000, XX-E-013, E-13AB21, E-13BB16, E-13EM01, E-13EN01, E-13EN03, E-13GN05, E-1F9431, M-12AB01, M-12BB02, M-12BN01, M-12EM01, M-12GN01, CR 25002, Calculation EJ-M-018

5.2.11 Turbine Driven Auxiliary Feedwater Pump (TDAFP)

A number of cables associated with the TDAFP are run through area A-27. These cables are listed in Table A-27-4. Damage to these cables could cause the TDAFP to be inoperable. Loss of the TDAFP is acceptable since the Train B Motor Driven Auxiliary Feedwater Pump (MDAFP) is available and is unaffected by a fire in area A-27. Therefore, the auxiliary feedwater requirement for decay heat removal is satisfied if a fire occurs in area A-27.

To prevent uncontrolled blowdown through the TDAFP flow path, either valves ABHV0005 and ABHV0006 or valve FCHV0312 needs to be closed. All three of these valves are normally closed and open upon receipt of an auxiliary feedwater actuation signal (AFAS). Based on Calculation XX-E-013, Appendix 1, the bypass valves (ABHV0048 and ABHV0049) on the ABHV0005 and ABHV0006 bypass lines are not included in the PFSSD design because blowdown through the 1-inch steam trap can be mitigated by adjusting the blowdown rate through the steam generator atmospheric relief valves.

Control cables associated with ABHV0005 (12ABK01AE and 12ABK01AF) and ABHV0006 (12ABK01BE and 12ABK01BF) are run through area A-27. Status indication cables associated with ABHV0005 (12SAZ23AA) and ABHV0006 (12SAZ23BA) are run through area A-27. It is unlikely that loss of status indication will cause a loss of control of these valves. However, damage to control cables could cause a loss of power to the control solenoid which would open the associated valve. Consequently, blowdown through the TDAFP is not controlled using valves ABHV0005 and ABHV0006.

Valve FCHV0312 is the turbine trip and throttle valve and is located downstream of valves ABHV0005 and ABHV0006 in the 4-inch steam line to KFC02. This valve is normally closed and, if maintained closed, will prevent uncontrolled steam blowdown through the AFP turbine. Cables associated with this valve (12FCK23AR, 12FCK23AS and 12FCK23AU) are run through area A-27. The possibility exists to spuriously open the valve due to a single intra-cable (conductor-to-conductor) or inter-cable (cable-to-cable) hot short between various combinations of conductors in these cables. Consequently, blowdown through the TDAFP is not controlled by valve FCHV0312.

Valve FCFV0313 is the TDAFP speed governing valve. Instrument cables associated with this valve (12FCK24AK and 12FCK24AQ) are run through area A-27. In addition, cable 12RPK09AA supplies power to relay panel RP266, which in turn powers panel FC219. Panel FC219 is the control panel for the TDAFP. Damage to cables 12FCK24AK and 12FCK24AQ could prevent operation of FCFV0313. Damage to cable 12RPK09AA could cause a loss of power to panel FC219 which would fail FCFV0313 full open. If this occurs coincident with either ABHV0005 or ABHV0006 failed open and FCHV0312 failed open, the turbine would overspeed and actuate the mechanical trip mechanism and close valve FCHV0312. This will prevent uncontrolled blowdown through the AFP turbine.

Cables associated with ALPT0026 (12ALI07KD and 12ALI07KE), TDAFW pump suction pressure transmitter, are run through area A-27. Loss of ALPT0026 is acceptable since MDAFW pump B is used for PFSSD if a fire occurs in area A-27.

Based on the above discussion, the TDAFP may not be available if a fire occurs in this area. The Train B MDAFP is available to supply auxiliary feedwater to steam generators A and D.

References: E-15000, XX-E-013, E-1F9101, E-13AB01, E-13AB01A, E-13AL07B, E-13FC23, E-13FC24, E-13SA23, M-0021-00086, M-12FC02, M-12AB02

5.2.12 Steam Generator Level Indication

The decay heat removal function for PFSSD requires the use of two RCS loops and two Steam Generators. Steam generator (SG) level indication is required to support this function. A fire in A-27 uses MDAFW pump B, which is normally aligned to supply SGs A and D. Table A-27-5 summarizes the level transmitters that could be affected by a fire in area A-27.

Table A-27-5
Steam Generator Level Transmitter Circuits in Area A-27

Transmitter	Description
AELT0502	SG B Wide Range Level Transmitter
AELT0503	SG C Wide Range Level Transmitter
AELT0504	SG D Wide Range Level Transmitter
AELT0517	SG A Narrow Range Level Transmitter
AELT0518	SG A Narrow Range Level Transmitter
AELT0519	SG A Narrow Range Level Transmitter
AELT0527	SG B Narrow Range Level Transmitter
AELT0528	SG B Narrow Range Level Transmitter
AELT0537	SG C Narrow Range Level Transmitter
AELT0538	SG C Narrow Range Level Transmitter
AELT0547	SG D Narrow Range Level Transmitter
AELT0548	SG D Narrow Range Level Transmitter
AELT0549	SG D Narrow Range Level Transmitter
AELT0552	SG B Narrow Range Level Transmitter
AELT0553	SG C Narrow Range Level Transmitter

As stated previously, a fire in area A-27 uses steam generators A and D. Steam generator A wide range level transmitter AELT0501 and narrow range level transmitter AELT0551 are available if a fire occurs in area A-27. Steam generator D narrow range level transmitter AELT0554 is available if a fire occurs in area A-27. Based on the above discussion, level indication on steam generators A and D is available if a fire occurs in area A-27.

References: E-15000, XX-E-013, E-1F9203, E-13AE08, E-13AE12, M-12AE02

5.2.13 Condensate Storage Tank Suction Pressure

The preferred suction source for auxiliary feedwater (AFW) is the condensate storage tank (CST). This tank provides a clean source of water to the steam generators. Upon low CST pressure, the suction source transfers to essential service water (ESW).

Three pressure transmitters are installed on the suction piping from the CST to the AFW pumps. These transmitters indicate CST pressure in the control room and automatically transfer the AFW suction to ESW upon low pressure on two out of three pressure transmitters.

Circuits for one of the three pressure transmitters (ALPT0038) run through fire area A-27. Damage to these circuits could prevent the pressure transmitter from functioning and could indicate a false low CST suction pressure. Circuits for the remaining two pressure transmitters (ALPT0027 and ALPT0029) are not run through area A-27. Therefore, CST level indication is available in the control room and spurious transfer to the ESW system is avoided.

A fire in area A-27 will not affect CST level indication in the control room and will not actuate a spurious ESFAS signal.

References: E-15000, XX-E-013, E-1F9202, E-13AL08, M-12AL01

5.2.14 RCS Hot and Cold Leg Temperature Elements

PFSSD requires RCS hot and cold leg temperature indication on at least one loop to verify flow through the steam generators. The temperature elements used for this purpose are listed in Table A-27-6.

The four cables associated with RCS temperature indication listed in Table A-27-4 run in the same raceway through area A-27 (2J1B1F). A fire could damage the cables and cause temperature indication on these four temperature elements (BBTE0413B, BBTE0423B, BBTE0433A and BBTE0443A) to be unavailable. Consequently, temperature indication on at least one leg on each loop could be lost, which is not in accordance with the PFSSD methodology at Wolf Creek.

Also, as discussed in Section 5.1.3, power to PN08 could be lost, resulting in a loss of power to temperature recorders BBTR0433 (loop 3) and BBTR0443 (loop 4). Based on drawing E-1F9201, this would result in a loss of temperature indication on loop 3 (hot and cold leg) and loop 4 (cold leg). The only available temperature indication is on loops 1 and 2 hot leg.

Table A-27-6
RCS Hot and Cold Leg Temperature Elements Used for PFSSD

COMPONENT	FUNCTION
BBTE0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	RCS Cold Leg Temperature Element (WR) Loop 4

EMG ES-04 provides alternate indication that may be used. One of these methods verifies that steam generator pressure is stable or decreasing. At least one pressure transmitter is available on each loop and can be used per EMG ES-04 to verify steam generator pressure in loops 1, 2, 3 and 4.

The configuration is acceptable because, in the event of fire in fire area A-27, cooldown will be performed using RCS loops 1 and 4. RCS wide range hot leg temperature indicator BBTI413A will provide temperature indication on loop 1 and and main steam line pressure transmitters ABPT514, ABPT0516, ABPT0544 and ABPT0546 will provide indication of RCS pressure on loops 1 and 4.

References: E-15000, XX-E-013, E-1F9201, E-13BB15, M-12AB01, M-12BB01

5.2.15 Residual Heat Removal (RHR)

PFSSD requires one train of residual heat removal (RHR) to be available for shutdown cooling. The RHR system is not used for hot standby. The PFSSD impact on the RHR system due to a spurious SIS is discussed in Section 5.2.10. This Section discusses fire damage to RHR system cables and components absent a spurious SIS. For a discussion of CCW to the RHR heat exchangers see Section 5.2.5.

Hot shutdown mode of PFSSD requires isolation of the RCS to RHR flow path by maintaining either BBPV8702A or EJHV8701A closed and either BBPV8702B or EJHV8701B closed. Cold shutdown mode of PFSSD requires RHR taking suction from the RCS. RHR pump suction from the RCS is controlled by valves BBPV8702A and EJHV8701A (Train A) and BBPV8702B and EJHV8701B (Train B).

A fire in area A-27 credits Train B RHR to achieve cold shutdown because Train A CCW could be lost as discussed in Section 5.2.3. Components and cables associated with Train A RHR system are unaffected by a fire in this area. However, loss of Train A CCW would prevent cooling of the Train A RHR heat exchanger. A number of Train B RHR components are affected by a fire in this area but, as described below, the damage will not prevent PFSSD because manual actions or repairs can be made within 72 hours. If Train A CCW is available, or if Train A CCW can be repaired within 72 hours, then operators can use Train A RHR for shutdown cooling.

Damage to cable 12BBI15NB, associated with pressure transmitter BBPT0403, could initiate a false High-1 RCS pressure signal and open the contacts on relay K734. This false High-1 pressure signal would prevent remote opening of valves BBPV8702A and BBPV8702B. Since cable 12BBI15NB runs through area A-27, a cold shutdown repair or a containment entry may be required to open valve BBPV8702B.

Cable 14BBG12AC is an interlock that prevents valve BBPV8702A from opening if valve EJHV8804A is open. Damage to this cable will have no impact on PFSSD since Train A RHR is not used for PFSSD if a fire occurs in area A-27.

Cables 14BBG12AF and 14BBG12AG are control cables associated with BBPV8702A. An inter-cable (cable-to-cable) hot short between conductors 2 in cable 14BBG12AF and 52 in cable 14BBG12AG will bypass the control room hand switch and open interlocks and cause valve BBPV8702A to open. Valve EJHV8701A will remain closed since cables associated with this valve are not run through area A-27. Therefore, the spurious opening of valve BBPV8702A is acceptable.

Cables 14BBG12BF and 14BBG12BG are control cables associated with BBPV8702B. An inter-cable (cable-to-cable) hot short between conductors 2 in cable 14BBG12BF and 52 in cable 14BBG12BG will bypass the control room hand switch and open interlocks and cause

valve BBPV8702B to open. Valve EJHV8701B will remain closed since cables associated with this valve are not run through area A-27. Therefore, the spurious opening of valve BBPV8702B is acceptable.

An open circuit in cable 14BBG12BF could prevent the remote opening of valve BBPV8702B when transitioning to RHR. If this occurs, a cold shutdown repair or a containment entry will be necessary to open the valve. Valve EJHV8701B can be controlled from the control room.

The RHR heat exchanger discharge control valve on the operating train (EJHCV0606 (Train A) or EJHCV0607 (Train B)) needs to be available. Cable 16EJI12BA, which is associated with EJHCV0607, runs through area A-27. Damage to cable 16EJI12BA could result in the loss of control of valve EJHCV0607. Valve EJHCV0607 is a fail open valve. Consequently, damage to this cable will most likely result in the valve remaining in its normally open position. If the valve closes, a cold shutdown repair or manual action will be necessary to open the valve.

The RHR pump discharge to RCS cold leg isolation valve (EJHV8809A or EJHV8809B) needs to be open on the operating train. Damage to cables 14EJG09BC and 14EJG09BD would likely result in valve EJHV8809B remaining in its as-is normally open position, which is the preferred PFSSD position. However, two proper intra-cable hot shorts in cable 14EJG09BD or one intra-cable hot short in cable 14EJG09BD combined with a short to ground on conductor U1 would spuriously close the valve. Cables for valve EJHV8809A are run in a separate fire area and are unaffected by a fire in area A-27. Therefore, Train A RHR pump discharge to RCS cold leg flow path is available for a fire anywhere in area A-27.

The cold shutdown mode of PFSSD requires isolation of hot leg recirculation. Valve EJHV8840 is used to isolate RHR flow to the RCS hot leg loops 2 and 3. This valve is normally closed and is required to be closed for cold shutdown. During hot standby, the valve can be in any position. Cables associated with valve EJHV8840 run through area A-27. Damage to cables 14EJG09AC and 14EJG09AD would likely result in valve EJHV8840 remaining in its as-is normally closed position, which is the preferred PFSSD position. However, two proper intra-cable hot shorts in cable 14EJG09AD or one intra-cable hot short in cable 14EJG09AD combined with a short to ground on conductor U1 would spuriously open the valve.

As stated above, the position valve EJHV8840 (open or closed) will not affect hot standby. The valve needs to be closed for cold shutdown. The valve has been modified to address NRC IN 92-18 and can be closed manually prior to entering shutdown cooling mode. The torque and limit switches are not bypassed by postulated damage to these cables.

Based on the above discussion, manual actions or cold shutdown repairs may be required to ensure the proper valve lineup when transferring to RHR. This is allowed per Wolf Creek's commitments to 10CFR50, Appendix R Section III.G.1.b. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-1F9205, E-13BB12A, E-13BB12B, E-13EJ05A, E-13EJ05B, E-13EJ08, E-13EJ09C, E-13EJ12, E-13PN01, E-13RL04, E-1R1421, J-200-00049, J-200-00051, M-12BB01, M-12EJ01, M-761-00104, CR 25002

5.2.16 Pressurizer Level Transmitters

PFSSD requires pressurizer level indication to be available. Pressurizer level indication is provided by level transmitters BBLT0459 and BBLT0460. Either level transmitter is required to be available for PFSSD.

Cable 12BBI16QB is run through area A-27 and is associated with BBLT0460. Damage to this cable will result in BBLT0460 being unavailable.

Circuits for BBLT0459 do not run through fire area A-27 and are unaffected by a fire in A-27. Therefore, pressurizer level indication is available for a fire in area A-27 using BBLT0459 and level indicator BBLI0459A.

References: E-15000, E-1F9301, E-13BB16

5.2.17 Control Room Lockout Relays

Lockout relay control panel RP334 houses relays used to isolate certain PFSSD components from the control room in the event of a control room fire. This panel is located in room 3302 (South ESF Switchgear Room).

Cable 12RPK15AA is associated with lockout relay 86XRP1, which is the lockout circuit for the TDAFP trip and throttle valve (FCHV0312). An open in this circuit will prevent isolating the control circuit for valve FCHV0312 from the control room. This is acceptable since the fire is not in the control room and damage to this circuit will not prevent the valve from performing its intended function. A conductor-to-conductor (intra-cable) short in this cable could bypass the hand switch and spuriously actuate the lock out relay signal. This will transfer control power for FCHV0312 to panel RP334, which is acceptable since the TDAFP is not required for PFSSD in the event of a fire in area A-27.

Cable 12RPK15BA is associated with lockout relay 86XRP2, which is the lockout circuit for the main steam supply valve to TDAFP (ABHV0006). An open in this circuit will prevent isolating the control circuit for valve ABHV0006 from the control room. This is acceptable since the fire is not in the control room and damage to this circuit will not prevent the valve from performing its intended function. A conductor-to-conductor (intra-cable) short in this cable could bypass the hand switch and spuriously actuate the lock out relay signal. This will transfer control power for ABHV0006 to panel RP334, which is acceptable since the TDAFP is not required for PFSSD in the event of a fire in area A-27.

Cable 12RPK15CA is associated with lockout relay 86XRP3, which is the lockout circuit for the main steam supply valve to TDAFP (ABHV0005). An open in this circuit will prevent isolating the control circuit for valve ABHV0005 from the control room. This is acceptable since the fire is not in the control room and damage to this circuit will not prevent the valve from performing its intended function. A conductor-to-conductor (intra-cable) short in this cable could bypass the hand switch and spuriously actuate the lock out relay signal. This will transfer control power for ABHV0005 to panel RP334, which is acceptable since the TDAFP is not required for PFSSD in the event of a fire in area A-27.

A fire in area A-27 involving the lockout relay circuits described above will not impact the ability to achieve and maintain PFSSD.

References: E-15000, XX-E-013, E-13AB01, E-13AB01A, E-13FC23, E-13RP14, E-13RP15

5.2.18 Refueling Water Storage Tank (RWST) and Containment Sump Isolation Valves

To prevent draindown of the RWST into the containment sump, PFSSD requires that either valve BNHV8812A or valve EJHV8811A and valve BNHV8812B or valve EJHV8811B be closed during hot standby. For cold shutdown, the operating train containment sump valve (EJHV8811A or EJHV8811B) must be closed to prevent flow diversion from the RCS to the containment sump. Valves BNHV8812A and BNHV8812B are normally open, and valves EJHV8811A and EJHV8811B are normally closed.

PFSSD cables for valves BNHV8812A and BNHV8812B do not run through fire area A-27. If valves EJHV8811A or EJHV8811B were to spuriously open, valves BNHV8812A and BNHV8812B can be closed from the control room.

Cables for valve EJHV8811A do not run through fire area A-27. Cable 14EJG06BC associated with EJHV8811B, runs in area A-27. Damage to cable 14EJG06BC will have no adverse impact since valve BNHV8812B is normally open, thereby preventing the permissive for valve EJHV8811B to open. If valve BNHV8812B is closed at the time of the fire and EJHV8811B spuriously opens, draindown will not occur because valve BNHV8812B is closed and will not spuriously open in the event of a fire in area A-27.

Cable 14BNI07FA, associated with RWST level transmitter BNLT0933, is run in area A-27. Cables for the remaining three RWST level transmitters do not run in area A-27. Consequently, a spurious low RWST level signal is not credible for a fire in area A-27.

Based on the above discussion, a fire in area A-27 will not cause the RWST to lose inventory into the containment sump.

References: E-15000, XX-E-013, E-1F9205, E-13BN03A, E-13BN07, E-13EJ06A, E-13EJ06B, M-12BN01, M-12EJ01, E-1R1423A, E-1R1423B

5.2.19 Main Steam Isolation Valve (MSIV) Bypass Valves

PFSSD requires that the MSIV bypass valves be closed to control cooldown. Several cables associated with the MSIV bypass valves (ABHV0012, ABHV0015, ABHV0018 and ABHV0021) are run in area A-27. These cables are associated with all close hand switch ABHS0079. Damage to these cables could result in the inability to maintain the MSIV bypass valves closed using ABHS0079.

Redundant means of ensuring the bypass valves remain closed are available and are unaffected by a fire in area A-27. This redundant means uses all close hand switch ABHS0080 to remove power to Separation Group 1 (Train A) solenoid valves ABHY0012A, ABHY0015A, ABHY0018A and ABHY0021A to close the valves. Therefore, a fire in A-27 will not prevent the closure of the MSIV bypass valves if they spuriously open.

Based on the above discussion, the MSIV bypass valves could spuriously open but can be re-closed using hand switch ABHS0080.

References: E-15000, XX-E-013, E-1F9101, E-13AB23A, E-13AB23B, E-13AB26, E-13AB27, E-13AB28, E-13AB29, M-12AB02

5.2.20 Reactor Coolant Pump (RCP) Seal Injection

PFSSD requires RCP seal injection to provide a boron injection path, provide makeup to the RCS and prevent damage to the RCP seals. Seal injection valves BBHV8351A, BBHV8351B, BBHV8351C and BBHV8351D are required to remain in their normally open position. Cables associated with these valves are listed in Table A-27-4.

Valves BBHV8351A, BBHV8351B, BBHV8351C and BBHV8351D are normally open and de-energized with the circuit breaker in the OFF position. Therefore, a fire affecting the control cables will not cause the valves to spuriously close. The seal injection valves are not high-low pressure interfaces, so consideration of a 3-phase hot short is not required. Therefore, damage to the power cables will not cause the valves to spuriously close.

Cable 14BGI51BA is associated with RCP seal total flow indicator BGFT0215B. Damage to this cable could prevent operation of the flow transmitter and could prevent operators from determining total RCP seal flow using flow indicator BGFI0215B. Flow indicator BGFI0215A is unaffected by a fire in area A-27 and can be used by operators to determine if seal flow is functioning.

Based on the above discussion, the seal injection valves will remain open in the event of a fire in area A-27. Therefore, RCP seal injection is available to provide hot standby inventory control and seal cooling. Loss of the operating charging pump would be indicated by loss of flow to the RCP seals using flow indicator BGFI0215A.

References: E-15000, XX-E-013, E-1F9102, E-13BB04, E-13BG51, M-12BB03

5.2.21 Reactor Coolant System (RCS) Pressure Indication

PFSSD requires RCS pressure indication to be available. RCS pressure indication is provided in the control room using BBPI0405 or BBPI0406.

Cable 14BBI16BA, associated with BBPT0406, runs through fire area A-27. Damage to this cable could prevent operation of the pressure transmitter and prevent pressure indication in the control room on BBPI0406.

Cables for BBPT0405 are run in a separate fire area and are unaffected by a fire in area A-27. Therefore, RCS pressure indication will be available using BBPI0405 if a fire occurs in area A-27.

References: E-15000, XX-E-013, E-1F9201, E-13BB15, E-13BB16, M-12BB04

5.2.22 Loss of Offsite Power

Cables associated with both trains of offsite power are run in area A-27. These cables are separation group 5 and 6 associated with XNB01 and XNB02. Damage to these cables will cause a loss of offsite power on both trains. Both trains of emergency diesel generators are available and can be lined up to the associated bus to provide power to PFSSD loads.

Loss of offsite power on both trains will not impact the ability to achieve and maintain PFSSD. For a more detailed evaluation of offsite power availability, refer to Calculation XX-E-013.

References: E-15000, XX-E-013, E-1F9425, E-1F9426, E-13NB03, E-13NB05, E-13NB10, E-13NB11

5.2.23 Steam Generator Blowdown to Blowdown Flash Tank Isolation Valves

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown. Cables associated with these valves are run through area A-27 and are listed in Table A-27-4.

Damage to cable 14RPK09AA could cause a loss of power to auxiliary relays 3XBM9, 3XBM10, 3XBM11 and 3XBM12, located in panel RP210, which will fail close valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004, respectively.

An open circuit on cables 14BMK06AC, 14BMK06BC, 14BMK06CC or 14BMK06DC will fail the associated valve closed, which is the desired PFSSD position. A hot short on these cables could prevent the associated valve from being closed using hand switches BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A.

Redundant means for closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 are available and are unaffected by a fire in area A-27. This redundant means uses BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C, located on the BM157 panel in the radwaste control room. Access to the radwaste control room can be gained from outside fire area A-27. As stated in Section 5.1.4, the possibility exists for a fire to cause loss of power to BM157. Loss of power will fail the valves closed, which is the desired PFSSD position.

A fire in area A-27 will not prevent closing steam generator blowdown valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004.

Thermal hydraulic analysis WCNOC-CP-002 shows insignificant impact on SG inventory even with all four blowdown valves open. Therefore, no E-1F9900 OMA is required to close blowdown valves to achieve and maintain hot standby. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 34.

References: E-15000, XX-E-013, E-1F9101, E-13BM06A, E-13BM06D, M-12BM01

5.2.24 Containment Coolers

PFSSD requires containment cooling to maintain the containment environment within EQ limits. Cables associated with both Train B containment coolers and all four Train B essential service water (ESW) supply valves are run in area A-27. These cables are listed in Table A-27-4.

Damage to these cables could prevent operation of the Train B containment coolers if a fire occurs in this area. Circuits for the Train A containment coolers are run in a separate fire area and are unaffected by a fire in area A-27. Train A ESW is available to supply water to the Train A containment coolers.

Based on the above discussion, the Train A containment coolers are available if a fire occurs in area A-27.

References: E-15000, XX-E-013, E-1F9403, E-1F9441, E-13EF07, E-13EF08, E-13EF09, E-13GN02, E-13GN02A, E-03NG01, M-12EF02, M-12GN01, SYS GK-200

5.2.25 Boron Injection Tank Flow Diversion

If charging flow through the BIT is used, flow diversion through the SIS test line should be avoided. Therefore, valves EMHV8843 and EMHV8882 need to be maintained closed. If either or both of these valves cannot be closed, then either valve EMHV8871 or EMHV8964 need to be closed. Cables associated with EMHV8882 are not run in area A-27. Therefore, valve EMHV8882 is unaffected by a fire in A-27 and will not spuriously open.

Cable 14EMK04CA is a control cable for EMHV8843. A +125 VDC external cable hot short in contact with conductor 2 in cable 14EMK04CA will energize the solenoid and open valve EMHV8843. The cable is run in raceways with cables carrying the proper voltage and polarity. The hot short would bypass the control room hand switch (EMHIS8843) on RL018 and control of this valve from the control room would be lost. Hand switch EMHS8843, located in room 1409, is unaffected by a fire in area A-27 and can be used to close valve EMHV8843 if this valve is unresponsive from the control room.

Cable 14EMK04EA is a control cable for EMHV8871. Damage to this cable could cause the valve to open due to an external +125VDC hot short.

Cables for normally closed valve EMHV8964 are unaffected by a fire in area A-27. Consequently, valve EMHV8964 will remain closed and flow diversion through the SIS test line will be averted.

References: E-15000, XX-E-013, E-1F9302, E-13EM04, E-13EM04A, E-13EM05A, M-12EM02

5.2.26 Safety Injection Accumulator Isolation Valves

PFSSD requires isolation of the SI accumulators prior to reducing RCS pressure below the injection pressure to avoid unnecessary accumulator discharge. This is accomplished by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. These valves are normally open with the MCC breaker locked in the open position. Cables 14EPG02CE and 14EPG02DE associated with valves EPHV8808B and EPHV8808D, respectively, are run in area A-27.

Since the breakers for these valves are normally open, damage to these cables will not cause the valve to spuriously change position. However, damage to the cables will prevent closing the associated valve from the control room, when necessary, after power is restored.

The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig. If necessary, a containment entry can be made to manually close the valves.

A fire in area A-27 may require a containment entry to close valves EPHV8808B and EPHV8808D if these valves are unresponsive from the control room.

References: E-15000, XX-E-013, E-13EP02A, M-12EP01

5.2.27 PFSSD Equipment Power Availability

PFSSD requires that one train of electrical systems required to power PFSSD components be available and be unaffected by a fire. Cable 14NBB14AD is a control cable for relay 62TDENB03. Damage to this cable could cause a spurious degraded voltage signal which could result in a loss of off-site power to bus NB02. If this occurs, the Train B Emergency Diesel Generator is available to power NB02.

A fire in area A-27 could result in a loss of off-site power. The Train B diesel generator is available to supply power to Train B safety-related and non-safety related PFSSD equipment.

References: E-15000, XX-E-013, E-1F9426, E-13NB14

5.2.28 Load Center Feeder Breakers PA0105 and PA0206

Load center feeder breakers PA0105 and PA0206 are credited for PFSSD because they supply power to credited non-safety related loads. Cables associated with these breakers run in this area. PFSSD impact due to damage to these cables is discussed below.

Cable 15PGA10AA is a control cable associated with breaker PA0105 and runs in fire area A-27. An intra-cable hot short in this cable will trip PA0105. Breaker PA0105 supplies power to the following PFSSD components:

- PG11JFR2 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0031
- PG11KBR3 – Auxiliary Steam System Control Valve FBHV0081

PG11JFR2 and PG11KBR3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using hand

switch ABHS0079. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Cable 16PGA10CA is a control cable associated with breaker PA0206 and runs in fire area A-27. An intra-cable hot short in this cable will trip PA0206. Breaker PA0206 supplies power to the following PFSSD components:

- PG12KAF4 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0032
- PG12KAF5 – Main Steam Supply to Steam Seals Valve ABHV0046
- PG12KEF3 – Auxiliary Steam System Control Valve FBHV0080

PG12KAF4, PG12KAF5 and PG12KEF3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using hand switch ABHS0079. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Based on the above discussion, loss of breakers PA0105 and PA0206 will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-13PG10, E-1F9424E

5.2.29 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs.

One control cable associated with each reactor coolant pump is run in fire area A-27. Damage to these cables in the event of a fire could prevent operators from stopping the RCPs from the control room. However, a fire in A-27 will not cause a loss of all seal cooling. Train B CCW is available to providing cooling to the RCP thermal barriers and the Train B CCP is available for seal injection.

Based on the above discussion, the inability to trip the RCPs from the control room will have no adverse impact on PFSSD. The pumps can continue to operate, providing forced flow circulation. If the pumps spuriously stop, natural circulation cooldown can be used.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1

5.2.30 Normal Pressurizer Spray

The normal pressurizer spray valves are included in the PFSSD design because spurious operation of pressurizer sprays can cause a decrease in pressure which can lead to boiling in the core. The pressurizer spray valves are part of the pressurizer pressure control system.

The pressurizer normal spray valves (BBPCV0455B and BBPCV0455C) operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

Instrument cables 12BBI16LB, 13BBI16MB and 14BBI16NB associated with pressurizer pressure transmitters BBPT0456, BBPT0457and BBPT0458, respectively, are run in fire area A-27. As discussed in Calculation XX-E-013, Appendix 1, damage to one or more pressure input channels will not cause the spurious operation of the pressurizer spray valves due to the

Ovation 4-channel validation logic. Therefore, a fire in area A-27 will not cause the spuriousoperation of pressurizer spray.

References: E-15000, XX-E-013, E-13BB16, M-744-00028, M-761A-00063

FIRE AREA A-28

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-28 is located on the 2026 elevation of the Auxiliary Building and includes the rooms listed in Table A-28-1.

Table A-28-1
Rooms Located in Fire Area A-28

ROOM #	DESCRIPTION
1413N	Train A Auxiliary Shutdown Panel (ASP) RP118A Room (North)
1413S	Train B Auxiliary Shutdown Panel (ASP) RP118B Room (South)

Fire area A-28 has automatic detection installed throughout. There is no automatic suppression in area A-28.

The area is divided into two distinct rooms divided by a 3-hour rated wall. The wall is credited as a qualified 3-hour fire barrier per drawing A-1803 but the two rooms are not considered separate fire areas. The 3-hour fire barrier meets the separation requirements of 10CFR50, Appendix R Section III.G.2.a.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-28-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-28-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-28			
System	**System Name**	**PFSSD Function***	**Comments**
AB	Main Steam	R, M, H, P, S	Room 1413N Control of steam generator ARVs ABPV0001 and ABPV0003 may not be achievable. Valve ABPV0001 can be failed closed by locally isolating air and nitrogen. Valve ABPV0003 can be controlled or closed using local controller ABFHC0003. Steam generator ARVs ABPV0002 and ABPV0004 are unaffected. Room 1413S Main steam to TDAFP valves ABHV0005 and ABHV0006 are affected and may not open. Control of steam generator ARVs ABPV0002 and ABPV0004 may not be achievable. Valve ABPV0002 can be controlled or closed using local controller ABFHC0002. Valve ABPV0004 can be closed by isolating air and nitrogen. Steam generator ARVs ABPV0001 and ABPV0003 are unaffected.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
AE	Main Feedwater	H, P	A fire in room 1413S could affect steam generator A, B, C and D level indication at RP118B. Steam generator level indication in the main control room is unaffected.
AL	Aux. Feedwater System	H, P	Room 1413N The TDAFP and the Train B MDAFP are available. The Train A MDAFP is affected. Use the TDAFP to supply SG B and the Train B MDAFP to supply SG D, since SGs B and D ARVs are unaffected. Room 1413S Train A MDAFP is available to supply SGs B and C. Steam generator B ARV may need to be locally controlled using ABFHC0002. The TDAFP and the Train B MDAFP are affected.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
BB	Reactor Coolant System	R, M, H, P, S	RCS level, pressure and temperature indication in room 1413S is affected. However, indication of these parameters in the control room is unaffected. Pressurizer backup group B heaters could be affected by a fire in room 1413S. The heaters are not credited for a fire in this area.

Table A-28-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-28

System	System Name	PFSSD Function*	Comments
BG	Chemical and Volume Control System	R, M, S	Room 1413N Letdown isolation valves BGLCV0459 and BGLCV0460 and letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C may not close using hand switches in the control room. These valves will automatically close when pressurizer level reaches 17%. Alternatively, the valves can be closed by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer level indication is available using BBLI0459A and BBLI0460A. Room 1413S Valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B and BGHV8149C are unaffected by a fire in room 1413S.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.

Table A-28-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-28

System	System Name	PFSSD Function*	Comments
FC	Auxiliary Turbines	R, H, P	Valves FCHV0312 and FCFV0313 are affected if a fire occurs in room 1413S. Use the Train A MDAFP to supply steam generators B and C.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.

Table A-28-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-28			
System	**System Name**	**PFSSD Function***	**Comments**
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.

Table A-28-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-28

System	System Name	PFSSD Function*	Comments
RP	Miscellaneous Control Panels	R, M, H, P, S	Room 1413N Panel RP118A and associated controls could be affected. Specific PFSSD components affected, and impact on the ability to achieve safe shutdown, is discussed in other sections. Room 1413S Panel RP118B and associated controls could be affected. Specific PFSSD components affected, and impact on the ability to achieve safe shutdown, is discussed in other sections. Control room lockout hand switches RPHIS0001 and RPHIS0002 could be damaged, causing a spurious lockout signal for associated Train B components. Redundant Train A components are unaffected. RPHIS0003 could also be damaged but this switch isolates PG2201 which supplies power to the pressurizer backup group B heaters. The heaters are only required for a control room fire.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
SB	Reactor Protection System	R, S	Signals from process protection racks SB041, SB148A and SB148B to a number of process monitoring instruments located on RP118B could be affected. Redundant process monitoring instruments in the main control room are unaffected.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
SE	Ex-Core Neutron Monitoring	R, P	Source range indicator SENI0061B at RP118B is affected. Source range monitoring in the control room is unaffected.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-28.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-28. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs

Room 1413N

For a fire in this room, the available success path includes the TDAFP supplying AFW to SG B and the Train B MDAFP supplying AFW to SG D. Steam generator A ARV ABPV0001 may need to be failed closed by isolating air (KAV1435) and nitrogen (KAV1364) and bleeding air from the regulator. Steam generator C ARV ABPV0003 may need to be closed using local controller ABFHC0003. Both actions are completed in fire area A-23.

Room 1413S

For a fire in this room, the available success path includes the Train A MDAFP supplying AFW to SGs B and C. Steam generator B ARV ABPV0002 may need to be controlled locally using ABFHC0002. Steam generator D ARV ABPV0004 may need to be failed closed by isolating air (KAV1429) and nitrogen (KAV1365) and bleeding air from the regulator.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Isolation of Letdown

A fire in area A-28 North could prevent valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B, and BGHV8149C from being closed using their associated control room hand switches. The valves will automatically close on low pressurizer pressure. In the unlikely event the low pressurizer pressure signal does not work the valves can be closed by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer level indication is available using BBLI0459A and BBLI0460A.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None specific to PFSSD

4.0 CONCLUSION

With some exceptions, redundant Post Fire Safe Shutdown capability exists if a severe fire occurs in area A-28. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-28.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-28

PFSSD components (S. in E-15000) located in fire area A-28 are shown in Table A-28-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-28-3.

Table A-28-3
PFSSD Equipment Located in Fire Area A-28

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1413S	ABHIS0005B	Valve ABHV0005 Hand Switch	5.1.1	
1413S	ABHIS0006B	Valve ABHV0006 Hand Switch	5.1.1	
1413N	ABHS0001	Valve ABPV0001 Hand Switch	5.1.1	
1413S	ABHS0002	Valve ABPV0002 Hand Switch	5.1.1	
1413N	ABHS0003	Valve ABPV0003 Hand Switch	5.1.1	
1413S	ABHS0004	Valve ABPV0004 Hand Switch	5.1.1	
1413N	ABPIC0001B	ABPV0001 Pressure Controller	5.1.1	
1413S	ABPIC0002B	ABPV0002 Pressure Controller	5.1.1	
1413N	ABPIC0003B	ABPV0003 Pressure Controller	5.1.1	
1413S	ABPIC0004B	ABPV0004 Pressure Controller	5.1.1	
1413S	AELI0502A	Steam Generator B WR Level Indication	5.1.2	
1413S	AELI0504A	Steam Generator D WR Level Indication	5.1.2	
1413S	AELI0517X	Steam Generator A NR Level Indication	5.1.2	
1413S	AELI0537X	Steam Generator C NR Level Indication	5.1.2	
1413S	ALHIS0022B	Train B MDAFP Hand Switch	5.1.3	
1413S	ALHIS0030B	ESW to MDAFP B Valve ALHV0030 Hand Switch	5.1.3	
1413S	ALHIS0033B	Train B ESW to TDAFP Valve ALHV0033 Hand Switch	5.1.3	
1413S	ALHIS0034B	CST to MDAFP B Valve ALHV0034 Hand Switch	5.1.3	
1413S	ALHK0005B	MDAFP B to SG D Valve ALHV0005 Hand Control Sta.	5.1.3	
1413S	ALHK0010B	TDAFP to SG B Valve ALHV0010 Hand Control Sta.	5.1.3	
1413S	ALHS0005	MDAFP B to SG D Valve ALHV0005 Hand Switch	5.1.3	
1413N	ALHS0006	TDAFP to SG D Valve ALHV0006 Hand Switch	5.1.3	
1413S	ALHS0007	MDAFP B to SG A Valve ALHV0007 Hand Switch	5.1.3	
1413N	ALHS0008	TDAFP to SG A Valve ALHV0008 Hand Switch	5.1.3	

Table A-28-3
PFSSD Equipment Located in Fire Area A-28

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1413N	ALHS0009	MDAFP A to SG B Valve ALHV0009 Hand Switch	5.1.3	
1413S	ALHS0010	TDAFP to SG B Valve ALHV0010 Hand Switch	5.1.3	
1413N	ALHS0011	MDAFP A to SG C Valve ALHV0011 Hand Switch	5.1.3	
1413S	ALHS0012	TDAFP to SG C Valve ALHV0012 Hand Switch	5.1.3	
1413S	ALPI0024B	MDAFP B Suction Pressure Indication	5.1.3	
1413S	ALPI0026B	TDAFP Suction Pressure Indication	5.1.3	
1413S	BBHIS0052B	480V Non-Class 1E Load Center PG22 Feeder Bkr HIS	5.1.9	
1413S	BBLI0460B	Pressurizer Level Indicator (Narrow Range)	5.1.4	
1413S	BBPI0406X	Reactor Coolant Sys Press Wide Range Hot Leg	5.1.4	
1413S	BBTI0423X	RCS Cold Leg Temp Indicator (WR) Loop 2	5.1.4	
1413S	BBTI0443A	RCS Hot Leg Temp Indicator (WR) Loop 4	5.1.4	
1413N	BGHIS0459A	Letdown Isolation Valve Hand Indicating Sw	5.1.5	
1413N	BGHIS0460A	Letdown Isolation Valve Hand Indicating Sw	5.1.5	
1413S	FCHIS0312B	AFWP Turbine Mech Trip/Throttle Valve HIS	5.1.3	
1413S	FCHIS0313B	AFWP Turbine Speed Governor Control	5.1.3	
1413S	FCHS0313	AFWP Turbine Speed Governor Control Xfer Switch	5.1.3	
1413S	FCSI0313B	AFWP Turbine Speed and Setpoint Indicator	5.1.3	
1413N	RP118A	Auxiliary Shutdown Panel Train A	5.1.6	
1413S	RP118B	Auxiliary Shutdown Panel Train B	5.1.6	
1413S	RPHIS0001	Control Room Isolation Switch	5.1.7	
1413S	RPHIS0002	Control Room Isolation Switch	5.1.7	
1413S	RPHIS0003	Control Room Isolation Switch	5.1.7	
1413S	SENI0061X	Source Range Neutron Flux Indicator	5.1.8	

5.1.1 Main Steam System

Several PFSSD cables and components associated with the main steam system are located in fire area A-28. These components are used for alternate shutdown if the control room needs to be evacuated. Each component, and associated cables, is discussed in the following paragraphs, as well as the impact of fire damage on the ability to safely shut down the plant.

Main Steam Supply to the TDAFP

ABHIS0005B is used in OFN RP-017 to open the steam supply from Loop 2 to the turbine driven auxiliary feedwater pump (TDAFP) (ABHV0005). ABHIS0006B is used in OFN RP-017 to open the steam supply from Loop 3 to the turbine driven auxiliary feedwater pump (TDAFP) (ABHV0006). Both hand switches are located in room 1413S and could be damaged if a fire occurs in this room. Either valve ABHV0005 or ABHV0006 is required to be open when using the TDAFP for PFSSD.

Cables 12ABK01AE, associated with ABHIS0005B, and 12ABK01BE, associated with ABHIS0006B, are run in room 1413S. Damage to the hand switches or associated cables could prevent opening at least one of the valves. Therefore, the TDAFP cannot be relied on if a fire occurs in room 1413S. A fire in room 1413N will not affect these valves, and therefore the steam supply to the TDAFP will be available for a fire in 1413N.

Main Steam Atmospheric Relief Valves

ABHS0001, ABHS0002, ABHS0003 and ABHS0004 are used to transfer control of atmospheric relief valves (ARV) ABPV0001, ABPV0002, ABPV0003 and ABPV0004 to the respective pressure indicating controller (PIC) at the auxiliary shutdown panel (ASP). Each hand switch has a normally open contact which, when closed, transfers control of the ARV to the respective Train ASP (RP118A or RP118B).

Room 1413N contains hand switches ABHS0001 and ABHS0003, and associated cables 11ABI20EC and 13ABI20GC. A fire in this room could cause a short in these cables and spuriously transfer control of ABPV0001 and ABPV0003 to panel RP118A. Pressure indicating controllers (PICs) ABPIC0001B and ABPIC0003B, and associated cables 11ABI20ED and 13ABI20GD, are also located in room 1413N. If these cables and/or PICs are also damaged, then the possibility exists for a loss of control of ABPV0001 and ABPV0003. Steam generator B and D ARVs ABPV0002 and ABPV0004 are unaffected by a fire in room 1413N. Steam generator A ARV ABPV0001 can be failed closed by isolating air and nitrogen to the valve and bleeding air off the regulator. Steam generator C ARV ABPV0003 can be controlled or closed using local controller ABFHC0003.

Room 1413S contains hand switches ABHS0002 and ABHS0004, and associated cables 12ABI20FK and 14ABI20HK. A fire in this room could cause a short in these cables and spuriously transfer control of ABPV0002 and ABPV0004 to panel RP118B. Pressure indicating controllers (PICs) ABPIC0002B and ABPIC0004B, and associated cables 12ABI20FG and 14ABI20HG, are also located in room 1413S. If these cables and/or PICs are also damaged, then the possibility exists for a loss of control of ABPV0002 and ABPV0004. Steam generator A and C ARVs ABPV0001 and ABPV0003 are unaffected by a fire in room 1413S. Steam generator D ARV ABPV0004 can be failed closed by isolating air and nitrogen to the valve and bleeding air off the regulator. Steam generator B ARV ABPV0002 can be controlled or closed using local controller ABFHC0002.

Based on the above discussion, at least two steam generator ARVs will be available if a fire occurs in either room 1413N or 1413S. For a discussion of Auxiliary Feedwater availability, see Section 5.1.3.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB01, E-13AB01A, E-13AB20A, E-13AB20B, J-110-00216, J-110-00220, J-110-00933, J-110-00934, J-201-00064, J-201-00065, M-12AB01, M-12AB02, E-1F9101, E-1F9202

5.1.2 Steam Generator Level Indication

Each steam generator is provided with five level transmitters; four narrow range and one wide range. The main control room (MCR) is provided with level indicators for all five level transmitters. The PFSSD design requires at least one level transmitter/indicator on each steam generator to be available.

Both Auxiliary Shutdown Panels (ASP) RP118A and RP118B contain a redundant level indicator for one of the five level transmitters on each steam generator. The level indicators on panel RP118A are not considered PFSSD components since they are not credited in a control room fire. The level indicators on panel RP118B are considered PFSSD components.

A fire in room 1413N (RP118A) or room 1413S (RP118B) could prevent operation of the level indicators within the room, but the redundant level indicators in the control room remain available. In addition, the remaining level transmitters that do not have indication at either RP118A or RP118B are available to provide steam generator level indication in the control room.

Steam generator level indication in the MCR is unaffected by a fire in area A-28.

References: E-15000, XX-E-013, E-13AE08, E-13SB16, E-1F9203, M-12AE02

5.1.3 Auxiliary Feedwater

The auxiliary feedwater (AFW) system is required to feed at least two steam generators to ensure PFSSD. The Train A motor driven auxiliary feedwater pump (MDAFP) supplies AFW to steam generators B and C. The Train B MDAFP supplies AFW to steam generators A and D. The turbine driven auxiliary feedwater pump (TDAFP) supplies AFW to all four steam generators.

<u>Turbine Driven Auxiliary Feedwater Pump</u>

As stated in Section 5.1.1, the TDAFP may not be available if a fire occurs in room 1413S due to the possible loss of steam supply to the pump turbine. In addition, room 1413S contains controls for TDAFP speed governing valve FCFV0313 and trip and throttle valve FCHV0312. Therefore, the TDAFP cannot be relied on if a fire occurs in room 1413S.

Other cables and components associated with the TDAFP are located in room 1413S that could prevent the ability of this pump to supply AFW to steam generators A, B, C and D. Therefore, the TDAFP cannot be relied on if a fire occurs in room 1413S.

Room 1413N does not contain any cables or controls associated with the TDAFP. The room does, however, contain cables and controls associated with certain AFW to steam generator supply valves and Train A ESW to TDAFP suction valve ALHV0032

Hand switch ALHS0006, associated with TDAFP to SG D valve ALHV0006, is located in room 1413N. This switch is used to transfer control of ALHV0006 from the control room to the ASP

(RP118A). Hand switch ALHS0008, associated with TDAFP to SG A valve ALHV0008, is located in room 1413N. This switch is used to transfer control of ALHV0008 from the control room to the ASP (RP118A).

Damage to these hand switches and associated cables could prevent control of these valves from the control room. Therefore, if a fire occurs in room 1413N, the TDAFP may not be available to supply AFW to steam generators A and D. The TDAFP would be available to supply AFW to steam generators B and C. However, as discussed in Section 5.1.1, atmospheric relief valve control on steam generator C could be lost. Local controller ABFHC0003, in fire area A-23, can be used to control ARV ABPV0003 on steam generator C.

Pressure indicator ALPI0026B and associated cable is located in room 1413S. Damage to this indicator will have no adverse impact on PFSSD since control room indication is available.

Based on the above discussion, a fire in room 1413S could prevent operation of the TDAFP but a fire in room 1413N can use the TDAFP to supply AFW to steam generators B and C, however, steam generator C ARV ABPV0003 may need to be controlled locally.

Motor Driven Auxiliary Feedwater Pump A

Hand switch ALHS0009, associated with MDAFP A to SG B valve ALHV0009, is located in room 1413N. This switch is used to transfer control of ALHV0009 from the control room to the ASP (RP118A). Hand switch ALHS0011, associated with MDAFP A to SG C valve ALHV0011, is located in room 1413N. This switch is used to transfer control of ALHV0011 from the control room to the ASP (RP118A).

Damage to these hand switches or associated cables could prevent MDAFP A from supplying AFW to steam generators B and C. In addition, other cables and components associated with MDAFP A are located in room 1413N. Therefore, the Train A MDAFP cannot be relied on if a fire occurs in room 1413N.

A fire in room 1413S does not affect MDAFP A and associated components. Therefore, MDAFP A is available to supply AFW to steam generators B and C if a fire occurs in room 1413S. However, as discussed in Section 5.1.1, atmospheric relief valve control on steam generators B and D could be lost. Local controller ABFHC0002, in fire area A-23, could be used to control ARV ABPV0002 on steam generator B.

Based on the above discussion, a fire in room 1413N could prevent operation of the Train A MDAFP, but a fire in room 1413S can use the Train A MDAFP to supply AFW to steam generators B and C, however steam generator B ARV ABPV0002 may need to be controlled locally.

Motor Driven Auxiliary Feedwater Pump B

Hand indicating switch ALHIS0022B is used to start the Train B MDAFP from the ASP (RP118B) in room 1413S. Cable 14ALB01BM is associated with hand switch ALHIS0022B. A short within the cable could cause the pump to either spuriously start or stop. If the pump starts, it is acceptable for PFSSD since this is the desired mode. If the pump stops, it can be re-started from the control room using ALHIS0022A. However, a persistent short in the stop circuit will cause the pump to re-stop. Therefore, the Train B MDAFP cannot be relied on to perform its function if a fire occurs in room 1413S. If the pump spuriously starts, it can be shut down by placing ALHIS0022A in pull-to-lock.

Hand indicating switch ALHIS0030B is located in room 1413S and is used to control ESW flow to MDAFP B. Cable 14ALG04AD is associated with this hand switch. A short in the cable could cause valve ALHV0030 to spuriously open or close.

Hand indicating switch ALHIS0034B is located in room 1413S and is used to control CST flow to MDAFP B. Cable 14ALG02AD is associated with this hand switch. A short in the cable could cause valve ALHV0034 to spuriously open or close.

Other cables and components associated with Train B MDAFP are located in room 1413S that could prevent the ability of this pump to supply AFW to steam generators A and D. Therefore, the Train B MDAFP cannot be relied on if a fire occurs in room 1413S.

A fire in room 1413N does not affect MDAFP B and associated components. Therefore, MDAFP B is available to supply AFW to steam generators A and D if a fire occurs in room 1413N. However, as discussed in Section 5.1.1, atmospheric relief valve control on steam generators A and C could be lost, which would require ARV ABPV0001 to be failed closed.

Based on the above discussion, a fire in room 1413S could prevent operation of the Train B MDAFP, but a fire in room 1413N can use the Train B MDAFP to supply AFW to steam generators A and D, however steam generator A ARV ABPV0001 may need to be failed closed.

Summary

If a fire occurs in room 1413N, use the TDAFP to supply AFW to SG B with the CST or Train B ESW as the suction source and use ARV ABPV0002 to control steam release. Also, use MDAFP B to supply AFW to SG D and use ARV ABPV0004 to control steam release. Fail close ARV ABPV0001 by isolating air and nitrogen and bleeding air from the regulator. Fail close ARV ABPV0003 using local controller ABFHC0003. If MDAFP A spuriously starts, it can be stopped by placing ALHIS0023A in pull-to-lock.

If a fire occurs in room 1413S, use the Train A MDAFP to supply AFW to SGs B and C with ESW or the CST as the suction source. Steam generator B ARV ABPV0002 may need to be controlled locally using ABFHC0002 while SG C ARV ABPV0003 can be controlled from the control room. Fail close ARV ABPV0004 by isolating air and nitrogen and bleeding air from the regulator. Fail close ARV ABPV0002 using local controller ABFHC0002 in fire area A-23. If MDAFP B spuriously starts, it can be stopped by placing ALHIS0022A in pull-to-lock. If the TDAFP spuriously starts, it may be necessary to locally trip FCHV0312 using local push button FCHS0332A.

References: E-15000, XX-E-013, E-13AL01A, E-13AL01B, E-13AL02B, E-13AL03A, E-13AL03B, E-13AL04B, E-13AL05A, E-13AL05B, E-13AL07A, E-13AL07B, E-13FC23, E-13FC24, M-12AL01, M-12FC02, E-1F9202, E-1F9203, E-1F9204

5.1.4 Primary System Instrumentation

Redundant indication associated with the RCS primary system is located on panels RP118A and RP118B. Indication located on RP118A is not considered in the PFSSD design since they are not credited in a control room fire.

Pressurizer Level Indication

Level transmitter BBLT0459 provides pressurizer level signals to level indicators BBLI0459A and BBLI0459B. Level indicator BBLI0459A is located in the main control room while BBLI0459B is located on panel RP118A.

Level transmitter BBLT0460 provides pressurizer level signals to level indicators BBLI0460A and BBLI0460B. Level indicator BBLI0460A is located in the main control room while

BBLI0460B is located on panel RP118B. Cable 14SBS16ZA runs in room 1413S to level indicator BBLI0460B.

A fire in either room 1413N (RP118A) or 1413S (RP118B) will not affect pressurizer level indicators in the control room. Cables providing level indication in the control room do not run through area A-28. Damage to the local indication circuits will not affect the redundant indicator in the control room. Therefore, pressurizer level indication will be available if a fire occurs in area A-28.

RCS Pressure Indication

RCS pressure transmitter BBPT0405 provides pressure signals to pressure indicators BBPI0405 and BBPI0405X. Pressure indicator BBPI0405 is located in the main control room while BBPI0405X is located on panel RP118A in room 1413N.

RCS pressure transmitter BBPT0406 provides pressure signals to pressure indicators BBPI0406 and BBPI0406X. Pressure indicator BBPI0406 is located in the main control room while BBPI0406X is located on panel RP118B in room 1413S. Cable 14SBS16NA runs in room 1413S to pressure indicator BBPI0406X.

A fire in either room 1413N (RP118A) or 1413S (RP118B) will not affect RCS pressure indicators in the control room. Cables providing RCS pressure indication in the control room do not run through area A-28. Damage to the local indication circuits will not affect the redundant indicator in the control room. Therefore, RCS pressure indication will be available if a fire occurs in area A-28.

RCS Temperature Indication

PFSSD requires RCS hot and cold leg temperature indication on at least one loop to verify flow through the steam generators.

RCS temperature element BBTE0423B provides loop 2 cold leg temperature signals to temperature indicators BBTI0423B in the control room and BBTI0423X at RP118B. Cable 14SBS16AA runs in room 1413S to BBTI0423X on panel RP118B.

RCS temperature element BBTE0443A provides loop 4 hot leg temperature signals to temperature indicator BBTI0443A at panel RP118B and temperature recorder BBTR0443 in the control room. Cable 14SBS16EA runs in room 1413S to BBTI0443A on panel RP118B.

A fire in either room 1413N (RP118A) or 1413S (RP118B) will not affect RCS temperature indication in the control room. Cables providing RCS temperature indication in the control room do not run through area A-28. Damage to the local indication circuits will not affect the redundant indicator in the control room. Therefore, RCS temperature indication will be available if a fire occurs in area A-28.

Summary

A fire in area A-28 will not adversely impact primary system instrumentation in the control room.

References: E-15000, XX-E-013, E-13BB15, E-13BB16, E-13SB09, E-13SB16, E-1F9201, E-1F9301, M-12BB01, M-12BB02, M-12BB04, M-761-02019, M-761-02029, M-761-02301, M-761-02302, M-761-02304, M-761-02311

5.1.5 Letdown Isolation Valves and Letdown Orifice Isolation Valves

During normal operation, letdown isolation valves BGLCV0459 and BGLCV0460 are open and at least one letdown orifice valve (BGHV8149A, BGHV8149B and BGHV8149C) is open. For PFSSD, the letdown flowpath is required to be isolated to prevent loss of inventory in the RCS. Letdown is isolated by closing either BGLCV0459 or BGLCV0460.

Hand switches BGHIS0459A and BGHIS0460A, and associated cables, are located in room 1413N. Placing either of these handswitches in the close position will open a maintained contact and de-energize the solenoid, causing the associated isolation valve (BGLCV0459 or BGLCV0460) to close. However, if any of the orifice valves (BGHV8149A, BGHV8149B and BGHV8149C) are open, the isolation valves (BGLCV0459 or BGLCV0460) will remain open until the orifice valves (BGHV8149A, BGHV8149B and BGHV8149C) are all closed or until the pressurizer reaches low level. A cable associated with all three letdown orifice isolation valves is located in fire area A-28 North. Damage to any of these cables could prevent closure of the associated orifice valve from the control room. In addition, a hot short within cables 15BGK10AD and 15BGK10BD could bypass the open contact on the handswitch, causing the isolation valves (BGLCV0459 or BGLCV0460) to open or remain open.

A hot short across the open contacts in hand switches BGHIS0459A and BGHIS0460A could provide a signal to open the valves. However, if any of the letdown orifice isolation valves are open, the letdown isolation valves (0459 and 0460) will not open. If the orifice valves are all closed, the flow path is isolated.

Based on the above discussion, a fire in room 1413N could prevent closing valves BGLCV0459 and BGLCV0460. However, the valves will automatically close when the pressurizer reaches low level. Alternatively, operators can fail air to the valves by closing valve KAFV0029 using KAHIS0029 in the main control room.

References: E-15000, XX-E-013, E-13BG10, E-13BG35, M-12BG01, E-1F9301

5.1.6 Auxiliary Shutdown Panel (Train A and B)

This fire area contains the auxiliary shutdown panels (RP118A and RP118B) for Train A and Train B. The effects of fire damage to these panels is discussed throughout this evaluation. Therefore, no further discussion will be made in this section.

5.1.7 Control Room Isolation Switches and Lock-Out Relays

Room 1413S contains control room lockout handswitches RPHIS0001, RPHIS0002 and RPHIS0003, and associated cables.

RPHIS0001 performs the following functions:

- Isolates valve FCHV0312 (TDAFP Turbine Trip and Throttle Valve) from the control room.
- Isolates main steam to TDAFP supply valves ABHV0005 and ABHV0006 from the control room.
- Isolates ABPV0002 indication from the control room.
- Isolates FCFV0313 (TDAFP Speed Governing Valve) position indication from the control room. (Note: This function is not required for PFSSD)

RPHIS0002 performs the following functions:

- Isolates BGHV8152 (Letdown Isolation Valve) from the control room. Note: This valve is no longer used for PFSSD.

- Isolates NB0208 trip hand switch from the control room. NB0208 supplies PG22, which supplies power to pressurizer heater backup group B. (This function is no longer required for PFSSD)
- Isolates valves ALHV0030, ALHV0033 and ALHV0034 from the control room and adds a redundant fuse in the circuit.
- Isolates ABPV0004 indication from the control room.
- Isolates MDAFP B from the control room and adds redundant fuses in the circuit.

RPHIS0003 performs the following functions:

- Isolates PG2201 control circuit from the control room. PG2201 supplies power to pressurizer heater backup group B. Isolation of the PG2201 control circuit using RPHIS0003 allows operation of the heater group using BBHIS0052B. The heaters are credited for a fire in the control room only (OFN RP-017).

A hot short across these hand switches or associated cables could initiate a false isolation signal and cause loss of control of these components from the control room. A loss of valves FCHV0312 and FCFV0313 is discussed in Section 5.1.3. Section 5.1.1 discusses valves ABHV0005 and ABHV0006. Position indication for valves ABPV0002 and ABPV0004 is discussed in Section 5.2.1. Valve BGHV8152 and breaker NB0208 are not PFSSD components, so a loss of these components will not affect PFSSD. Valves ALHV0030, ALHV0033 and ALHV0034 are discussed in Section 5.1.3. AFW pump DPAL01B is discussed in Section 5.1.3. Hand switch BBHIS0052B is discussed in Section 5.1.9.

Based on the above discussion and the discussions in Sections 5.1.1, 5.1.3 and 5.1.9, damage to control room lockout hand switches RPHIS0001, RPHIS0002 and RPHIS0003, and associated cables, will not prevent safe shutdown due to the availability of redundant capability in a separate fire area.

References: E-15000, XX-E-013, E-13AB01, E-13AB01A, E-13AB06B, E-13AL01B, E-13AL02B, E-13AL04B, E-13BB24, E-13BG17, E-13FC23, E-13FC25, E-13RP11, E-13RP12, E-13RP13, E-13RP15, E-1F9101, E-1F9202, E-1F9204, M-12AB01, M-12AB02, M-12AL01, M-12BG01, M-12FC02

5.1.8 Source Range Indication

Source range indicator SENI0061X is located on panel RP118B. Damage to this indicator and associated cable will not affect source range indication in the control room. Therefore, source range monitoring is available if a fire occurs in area A-28.

References: E-15000, XX-E-013, E-13SE07, E-1F9101

5.1.9 Pressurizer Backup Heater Group B

The pressurizer backup group B heaters are credited for a control room fire per procedure OFN RP-017. The heaters are not required for post-fire safe shutdown following a fire in other areas of the plant.

Hand switch BBHIS0052B, associated with pressurizer backup group B heaters, is located in fire area A-28S. This hand switch is credited in the event of a control room fire to control the heater bank and maintain pressurizer pressure.

Damage to this hand switch could cause the spurious operation or mal-operation of the backup group B heaters. Calculation WCNOC-CP-002 shows that spurious operation or mal-operation of the heaters for a fire outside the control room will not adversely impact the ability to achieve

safe shutdown. Therefore, damage to this switch in the event of a fire in area A-28S will not affect safe shutdown.

References: E-15000, XX-E-013, E-13BB24, WCNOC-CP-002

5.2 PFSSD CABLE EVALUATION

Table A-28-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-28. The applicable evaluation section is also listed in Table A-28-4.

Table A-28-4
PFSSD Cables Located in Fire Area A-28

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ABI20EC	1413N	ABPV0001	I	5.1.1	SG A ARV Switch ABHS0001 at RP118A
11ABI20ED	1413N	ABPV0001	I	5.1.1	SG A ARV PIC ABPIC0001B at RP118A
11ALB01AD	1413N	PAL01A	C	5.1.3	Train A MDAFP
11ALB01AS	1413N	PAL01A	C	5.1.3	Train A MDAFP
11ALG04BD	1413N	ALHV0031	C	5.1.3	ESW to MDAFP A Suction
11ALG04CD	1413N	ALHV0032	C	5.1.3	ESW to TDAFP Suction (Train A)
11ALI03AC	1413N	ALHV0009	I	5.1.3	Train A MDAFP to SG B Iso Vlv Sw ALHS0009 at RP118A
11ALI03BC	1413N	ALHV0011	I	5.1.3	Train A MDAFP to SG C Iso Vlv Sw ALHS0011 at RP118A
11ALI05AC	1413N	ALHV0006	I	5.1.3	TDAFWP to SG D Switch ALHS0006 at RP118A
11ALI05BC	1413N	ALHV0008	I	5.1.3	TDAFWP to SG A Switch ALHS0008 at RP118A
12ABI20FG	1413S	ABPV0002	I	5.1.1	SG B ARV PIC ABPIC0002B at RP118B
12ABI20FK	1413S	ABPV0002	I	5.1.1	SG B ARV Switch ABHS0002 at RP118B
12ABK01AE	1413S	ABHV0005	C	5.1.1	Main Steam Loop 2 To AFWP Turbine Iso ABHIS0005B at RP118B
12ABK01BE	1413S	ABHV0006	C	5.1.1	Main Steam Loop 3 To AFWP Turbine Iso ABHIS0006B at RP118B
12ALI07KE	1413S	ALPT0026	I	5.1.3	TDAFP Suction Pressure Ind ALPI0026B at RP118B
12FCK23AD	1413S	FCHV0312	C	5.1.3	TDAFP Mech Trip/Throttle Valve (FCHIS0312B)
12FCK24AQ	1413S	FCFV0313	I	5.1.3	TDAFWP Speed Governing Vlv Control (FCHIS0313B) at RP118B
12RPK15AA	1413S	86XRP1 FCHV0312	C	5.1.7	Lockout Relay TDAFP Mech Trip/Throttle Valve

Table A-28-4
PFSSD Cables Located in Fire Area A-28

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12RPK15BA	1413S	86XRP2 ABHV0006 FCFV0313	C	5.1.7	Lockout Relay Main Steam Loop 3 To AFWP Turbine Isolation AFWP Turbine Speed-Governing Valve
12RPK15CA	1413S	86XRP3 ABHV0005 ABPV0002	C	5.1.7	Lockout Relay Main Steam Loop 2 To AFWP Turbine Isolation ARV ABPV0002 Position Indication
13ABI20GC	1413N	ABPV0003	I	5.1.1	SG C ARV Switch ABHS0003 at RP118A
13ABI20GD	1413N	ABPV0003	I	5.1.1	SG C ARV PIC ABPIC0003B at RP118A
14ABI20HG	1413S	ABPV0004	I	5.1.1	SG D ARV PIC ABPIC0004B at RP118B
14ABI20HK	1413S	ABPV0004	I	5.1.1	SG D ARV Switch ABHS0004 at RP118B
14ALB01B1	1413S	DPAL01B	C	5.1.3	Train B MDAFP
14ALB01BD	1413S	ALHIS0022B	C	5.1.3	Train B MDAFP Hand Switch at RP118B
14ALB01BM	1413S	ALHIS0022B	C	5.1.3	Train B MDAFP Hand Switch at RP118B
14ALG02AD	1413S	ALHV0034	C	5.1.3	CST to MDAFP B Vlv Switch ALHIS0034B at RP118B
14ALG04AD	1413S	ALHV0030	C	5.1.3	ESW to MDAFP B Vlv Switch ALHIS0030B at RP118B
14ALG04DD	1413S	ALHV0033	C	5.1.3	ESW to TDAFP Valve Switch ALHIS0033B at RP118B
14ALI03AG	1413S	ALHV0005	I	5.1.3	MDAFP B to SG D Iso Vlv Sw ALHK0005B at RP118B
14ALI03AH	1413S	ALHV0005	I	5.1.3	MDAFP B to SG D Iso Vlv Sw ALHS0005 at RP118B
14ALI03BC	1413S	ALHV0007	I	5.1.3	MDAFP B to SG A Iso Vlv Sw ALHS0007 at RP118B
14ALI05AK	1413S	ALHV0010	I	5.1.3	TDAFP to SG B Iso Vlv Sw ALHK0010B at RP118B
14ALI05AN	1413S	ALHV0010	I	5.1.3	TDAFP to SG B Iso Vlv Sw ALHS0010 at RP118B
14ALI05BC	1413S	ALHV0012	I	5.1.3	TDAFP to SG C Iso Vlv Sw ALHS0012 at RP118B
14ALI07AE	1413S	ALFT0001	I	5.1.3	AFW to SG D Flow Indication at RP118B

Table A-28-4
PFSSD Cables Located in Fire Area A-28

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALI07HE	1413S	ALPT0024	I	5.1.3	MDAFP B Suction PI ALPI0024B at RP118B
14RPK15BA	1413S	ALHV0030 ALHV0034 86XRP5	C	5.1.7	ESW to MDAFW Pump B MDAFW Pump B Suction from CST ALHV0030 and ALHV0034 lockout relay
14RPK15CA	1413S	ALHV0033 86XRP6 ABPV0004	C	5.1.7	TDAFP Suction Valve from ESW B ALHV0033 lockout relay ARV ABPV0004 Position Indication
14RPK15DA	1413S	DPAL01B 86XRP7	C	5.1.7	AFW Pump B Motor DPAL01B lockout relay
14SBS16AA	1413S	BBTI0423X	I	5.1.4	RCS Cold Leg Temp Indicator (WR) Loop 2
14SBS16EA	1413S	BBTI0443A	I	5.1.4	RCS Hot Leg Temp Indicator (WR) Loop 4
14SBS16MA	1413S	AELI0517X	I	5.1.2	Steam Generator A NR Level at RP118B
14SBS16NA	1413S	BBPI0406X	I	5.1.4	RCS Pressure Indication (WR) Hot Leg at RP118B
14SBS16PA	1413S	AELI0537X	I	5.1.2	Steam Generator C NR Level at RP118B
14SBS16XA	1413S	AELI0502A	I	5.1.2	Steam Generator B WR Level at RP118B
14SBS16YA	1413S	AELI0504A	I	5.1.2	Steam Generator D WR Level at RP118B
14SBS16ZA	1413S	BBLI0460B	I	5.1.4	Pressurizer Level Indication (NR) at RP118B
14SES07BB	1413S	SENY0061B	I	5.1.8	Source Range Indication at RP118B
15BGK10AD	1413N	BGLCV0459	C	5.1.5	Letdown Isolation Valve Sw BGHIS0459A at RP118A
15BGK10BD	1413N	BGLCV0460	C	5.1.5	Letdown Isolation Valve Sw BGHIS0460A at RP118A
15BGK35AD	1413N	BGHV8149A	C	5.1.5	Letdown Orifice Isolation Valve
15BGK35BD	1413N	BGHV8149B	C	5.1.5	Letdown Orifice Isolation Valve
15BGK35CD	1413N	BGHV8149C	C	5.1.5	Letdown Orifice Isolation Valve

FIRE AREA A-29

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area A-29 is located on the 2000 and 2013 elevations of the Auxiliary Building and includes the rooms listed in Table A-29-1.

Table A-29-1
Rooms Located in Fire Area A-29

ROOM #	DESCRIPTION
1304	Auxiliary Feedwater Pipe Chase El. 2013-6
1324	Feedwater Pump Valve Compartment No. 1 El. 2000-0
1327	Feedwater Pump Valve Compartment No. 2 El. 2000-0

There is no automatic fire suppression or detection in fire area A-29. The area is separated from adjacent areas by minimum 3-hour fire rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-29-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-29-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-29

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Steam Generator C ARV ABPV0003 may need to be controlled or closed using local controller ABFHC0003 in area A-23. The main control room pressure controller for Steam Generators A, B and D ARVs (ABPV0001, ABPV0002 and ABPV0004) may need to be placed in manual and the ARV controlled or closed from the control room.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
AL	Aux. Feedwater System	H, P	All three auxiliary feedwater pumps are available. However, auxiliary feedwater flow from the Train B motor driven auxiliary feedwater pump (MDAFP) and the turbine driven auxiliary feedwater pump (TDAFP) to steam generators (SGs) A and D may be affected. In addition auxiliary feedwater flow from the TDAFP to SG B may be affected. The Train A MDAFP is available to supply auxiliary feedwater to SGs B and C and the TDAFP is available to supply auxiliary feedwater to SG C.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
BM	Steam Generator Blowdown System	R, M, H	The ability to isolate blowdown from the Radwaste Control Room may be affected. All four blowdown valves can be isolated from the main control room using BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.

Table A-29-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-29

System	System Name	PFSSD Function*	Comments
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.

Table A-29-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-29

System	System Name	PFSSD Function*	Comments
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.

Table A-29-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-29			
System	**System Name**	**PFSSD Function***	**Comments**
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-29.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-29. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs

It may be necessary to control or close ARV ABPV0003 using local control station ABFHC0003. This action can be performed by an operator in fire area A-23. Emergency lighting and communication are available.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Steam Generator ARVs

ARVs ABPV0001, ABPV0002 and ABPV0004 may spuriously open. If this occurs, place ABPIC0001A, ABPIC0002A and ABPIC0004A in manual and control the ARVs from the main control room.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Redundant Post Fire Safe Shutdown capability that is unaffected by a severe design basis fire does not exist in area A-29. However, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-29.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-29

PFSSD components (S. in E-15000) located in fire area A-29 are shown in Table A-29-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-29-3.

Table A-29-3
PFSSD Equipment Located in Fire Area A-29

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1304	ABPT0001	SG A Steamline Pressure Transmitter	5.1.1	
1304	ABPT0004	SG D Steamline Pressure Transmitter	5.1.1	
1304	ALFT0001	Auxiliary Feedwater to Steam Generator D Flow	5.1.2	
1304	ALFT0007	Auxiliary Feedwater to Steam Generator A Flow	5.1.2	
1324	ALHV0005	MDAFP B Discharge to SG D Isolation Valve	5.1.2	
1324	ALHV0007	MDAFP B Discharge to SG A Isolation Valve	5.1.2	
1327	ALHV0006	TDAFP Discharge to SG D Isolation Valve	5.1.2	
1327	ALHV0008	TDAFP Discharge to SG A Isolation Valve	5.1.2	
1327	ALHY0006	ALHV0006 I/P Converter	5.1.2	
1327	ALHY0008	ALHV0008 I/P Converter	5.1.2	

5.1.1 Steam Generator Atmospheric Relief Valves

Pressure transmitters ABPT0001 and ABPT0004 and associated cables are located in area A-29. In addition, cables associated with ABPT0002 and ABPT0003 are run in area A-29. The effects of damage to these cables and components are described in the following paragraphs.

Cable 11ABI20EA provides a signal from pressure transmitter ABPT0001 to ARV ABPV0001 controller and opens the valve when steamline pressure reaches a designated setpoint. Damage to the pressure transmitter or cable due to a fire could cause a spurious high pressure signal which would open the ARV. If this occurs, operators can place ABPIC0001A in manual and control the ARV from the control room. Position indication for ABPV0001 on RL006 remains available, so operators would quickly recognize if the ARV is open. Cables associated with the ARV controller I/P device (ABPY0001) do not run in area A-29.

Cable 12ABI20FH provides a signal from pressure transmitter ABPT0002 to ARV ABPV0002 controller and opens the valve when steamline pressure reaches a designated setpoint. Damage to the cable due to a fire could cause a spurious high pressure signal which would open the ARV. If this occurs, operators can place ABPIC0002A in manual and control the ARV from the control room. Position indication for ABPV0002 on RL006 remains available, so operators would quickly recognize if the ARV is open. Cables associated with the ARV controller I/P device (ABPY0002) do not run in area A-29.

Cable 13ABI20GE provides a signal from ARV ABPV0003 controller to pressure transducer ABPY0003. Cable 13ABI20GA provides a signal from ABPT0003 to ARV ABPV0003 controller. The transducer signals the position controller (ABZC0003) on ABPV0003 to open whenever steamline pressure reaches a designated setpoint. Damage to the cables due to a fire could cause a spurious signal which could open the ARV. Damage to cable 13ABI20GE could prevent manual operation of the valve from the control room. If the ARV spuriously opens, operators would have to close it using local controller ABFHC0003 in area A-23.

Cable 14ABI20HH provides a signal from pressure transmitter ABPT0004 to ARV ABPV0004 controller and opens the valve when steamline pressure reaches a designated setpoint. Damage to the pressure transmitter or cable due to a fire could cause a spurious high pressure signal which would open the ARV. If this occurs, operators can place ABPIC0004A in manual and control the ARV from the control room. Cables associated with the ARV controller I/P device (ABPY0004) do not run in area A-29.

Based on the above discussion, steam generator ARVs ABPV0001, ABPV0002 and ABPV0004 can be controlled or closed from the control room. Steam generator ARV ABPV0003 may need to be controlled or closed using local controller ABFHC0003 in fire area A-23. Based on Section 5.1.2, the Train B MDAFP may not be available to supply steam generators A and D but the Train A MDAFP is available to supply steam generators B and C. In addition, the TDAFP is available to supply steam generator C only.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB20A, E-13AB20B, E-13AB21, E-1F9101, M-12AB01

5.1.2 Auxiliary Feedwater

Several components and cables associated with Auxiliary Feedwater are located in this area. The following paragraphs discuss the impact on PFSSD of damage to these cables and components.

Flow transmitters ALFT0001 and ALFT0007 and associated cables are located in this area. Damage to these components and cables could cause a spurious flow indication which could cause valves ALHV0005 and ALHV0007 to modulate or close, preventing adequate auxiliary feedwater flow from Train B motor driven auxiliary feedwater pump (PAL01B) to steam generators A and D.

All four auxiliary feedwater to steam generators A and D supply valves (ALHV0005, ALHV0006, ALHV0007 and ALHV0008) are located in this area. In addition, power and control cables associated with these valves are run in this area. Damage to these cables and valves could prevent auxiliary feedwater flow from PAL01B and the turbine driven auxiliary feedwater pump (PAL02) to steam generators A and D.

Cables associated with ALHV0010 are run in this area. Damage to these cables could affect the operability of the valve and could prevent auxiliary feedwater flow from PAL02 to steam generator B.

The Train A motor driven auxiliary feedwater pump (PAL01A) is available to supply auxiliary feedwater to steam generators B and C via valves ALHV0009 and ALHV0011. The TDAFP is also available but may be limited to supplying only steam generator C. Therefore, if a fire occurs in area A-29, the credited auxiliary feedwater flowpath is PAL01A supplying auxiliary feedwater to steam generators B and C. Based on the discussion in Section 5.1.1, steam generator C ARV ABPV0003 may need to be controlled locally in fire area A-23.

References: E-15000, XX-E-013, E-13AL03A, E-13AL03B, E-13AL05A, E-13AL05B, E-13AL07B, E-13AL09, E-1F9203, E-1F9204, M-12AL01

5.2 PFSSD CABLE EVALUATION

Table A-29-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-29. The applicable evaluation section is also listed in Table A-29-4.

Table A-29-4
PFSSD Cables Located in Fire Area A-29

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ABI20EA	1304	ABPV0001	I	5.1.1	SG A Steamline Pressure (ABPT0001)
11ABI21JA	1304	ABPT0514	I	5.2.1	SG A Steamline Pressure Transmitter
11ABI21UA	1304	ABPT0544	I	5.2.1	SG D Steamline Pressure Transmitter
11ALI05AD	1304, 1327	ALHV0006	I	5.1.2	TDAFP Discharge to SG D (ALHY0006)
11ALI05AE	1304, 1327	ALHV0006	I	5.1.2	TDAFP Discharge to SG D
11ALI05AF	1304, 1327	ALHV0006	I	5.1.2	TDAFP Discharge to SG D
11ALI05BD	1304, 1327	ALHV0008	I	5.1.2	TDAFP Discharge to SG A (ALHY0008)
11ALI05BE	1304, 1327	ALHV0008	I	5.1.2	TDAFP Discharge to SG A
11ALI05BF	1304, 1327	ALHV0008	I	5.1.2	TDAFP Discharge to SG A
12ABI20FH	1304	ABPV0002	I	5.1.1	SG B Steamline Pressure (ABPT0002)
13ABI20GA	1304	ABPV0003	I	5.1.1	SG C Steamline Pressure (ABPT0003)
13ABI20GE	1304	ABPV0003	I	5.1.1	SG C Steamline Pressure (ABPY0003)
13ABI21PA	1304	ABPT0526	I	5.2.1	SG B Steamline Pressure Transmitter
13ABI21TA	1304	ABPT0536	I	5.2.1	SG C Steamline Pressure Transmitter
14ABI20HH	1304	ABPV0004	I	5.1.1	SG D Steamline Pressure (ABPT0004)
14ALI03AJ	1304, 1324	ALHV0005	I	5.1.2	MDAFP B Discharge to SG D Iso Valve
14ALI03AK	1304, 1324	ALHV0005	I	5.1.2	MDAFP B Discharge to SG D Iso Valve
14ALI03AL	1304, 1324	ALHV0005	I	5.1.2	MDAFP B Discharge to SG D Iso Valve
14ALI03BD	1304, 1324	ALHV0007	I	5.1.2	MDAFP B Discharge to SG A Iso Valve
14ALI03BE	1304, 1324	ALHV0007	I	5.1.2	MDAFP B Discharge to SG A Iso Valve
14ALI03BF	1304, 1324	ALHV0007	I	5.1.2	MDAFP B Discharge to SG A Iso Valve
14ALI05AG	1304	ALHV0010	I	5.1.2	TDAFP Discharge to SG B
14ALI05AH	1304	ALHV0010	I	5.1.2	TDAFP Discharge to SG B

Table A-29-4
PFSSD Cables Located in Fire Area A-29

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALI07AD	1304	ALFT0001	I	5.1.2	AFW to Steam Generator D Flow
14ALI09AA	1304	ALFT0007	I	5.1.2	AFW to Steam Generator A Flow
14ALY09AB	1324	ALHV0005	P	5.1.2	MDAFP B Discharge to SG D Iso Valve
14ALY09BB	1324	ALHV0007	P	5.1.2	MDAFP B Discharge to SG A Iso Valve
15BMK06AA	1304	BMHV0001	C	5.2.2	SG A to Blowdown Flash Tank Isolation Valve
15BMK06DA	1304	BMHV0004	C	5.2.2	SG D to Blowdown Flash Tank Isolation Valve

5.2.1 Safety Injection

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. This condition is not desirable for PFSSD at Wolf Creek.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and, ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Cables associated with steam line pressure transmitters ABPT0514, ABPT0526, ABPT0536 and ABPT0544 are run in area A-29. Consequently, the two out of three logic for low steam line pressure initiation of SIS cannot be satisfied if a fire occurs in area A-29.

References: E-15000, XX-E-013, E-13AB21, E-1F9431, E-1F9432, M-12AB01

5.2.2 Steam Generator Blowdown to Blowdown Flash Tank Isolation Valves

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown. The valves are air operated and each valve is controlled by three solenoid valves. All three solenoid valves are required to be energized to open the valve. If any one solenoid is de-energized, the associated valve will close or remain closed. Only two of the three solenoids for each valve are considered in the PFSSD analysis, so the third solenoid is assumed energized throughout the event.

Cables 15BMK06AA and 15BMK06DA, associated with blowdown valves BMHV0001 and BMHV0004, are run in area A-29. These cables are associated with blowdown handswitches located on the BM157 panel in the radwaste control room. Damage to these cables will have no adverse impact on the ability to close the blowdown valves using applicable handswitches in the main control room.

References: E-15000, XX-E-013, E-13BM06A, E-13BM06D, E-1F9101, M-12BM01

FIRE AREA A-30

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1.0 GENERAL AREA DESCRIPTION

Fire area A-30 is located on the 2000 elevation of the Auxiliary Building and includes the rooms listed in Table A-30-1.

Table A-30-1
Rooms Located in Fire Area A-30

ROOM #	DESCRIPTION
1305	Auxiliary Feedwater Pipe Chase El. 2013-6
1328	Feedwater Pump Valve Compartment No. 3 El. 2000-0
1330	Feedwater Pump Valve Compartment No. 4 El. 2000-0

There is no automatic fire suppression or detection in fire area A-30. The area is separated from adjacent areas by minimum 3-hour fire rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-30-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-30-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-30

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Steam Generator C ARV ABPV0003 may need to be controlled or closed using local controller ABFHC0003 in area A-23. The controller (ABPIC0002A) for Steam Generator B ARV may need to be placed in manual and the ARV controlled or closed from the control room. Steam generators A and D ARVs ABPV0001 and ABPV0004 are unaffected by a fire in this area.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
AL	Aux. Feedwater System	H, P	All three auxiliary feedwater pumps are available. However, auxiliary feedwater flow from the Train A motor driven auxiliary feedwater pump (MDAFP) and the turbine driven auxiliary feedwater pump (TDAFP) to steam generators (SGs) B and C may be affected. In addition auxiliary feedwater flow from the TDAFP to SGs A and D may be affected. The Train B MDAFP is available to supply auxiliary feedwater to SGs A and D.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
BM	Steam Generator Blowdown System	R, M, H	The ability to isolate blowdown from the Radwaste Control Room may be affected. All four blowdown valves can be isolated from the main control room using BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.

Table A-30-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-30

System	System Name	PFSSD Function*	Comments
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.

Table A-30-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-30

System	System Name	PFSSD Function*	Comments
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.

Table A-30-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-30

System	System Name	PFSSD Function*	Comments
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-30.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-30. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs

It may be necessary to control or close ABPV0003 using local control station ABFHC0003. This action can be performed by an operator in fire area A-23. Emergency lighting and communication are available.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Steam Generator ARVs

ARV ABPV0002 may spuriously open. If this occurs, place ABPIC0002A in manual and control or close the ARV from the main control room.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Redundant Post Fire Safe Shutdown capability that is unaffected by a severe design basis fire does not exist in area A-30. However, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-30.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-30

PFSSD components (S. in E-15000) located in fire area A-30 are shown in Table A-30-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-30-3.

Table A-30-3
PFSSD Equipment Located in Fire Area A-30

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1305	ABPT0002	SG B Steamline Pressure Transmitter	5.1.1	
1305	ABPT0003	SG C Steamline Pressure Transmitter	5.1.1	
1305	ALFT0011	Auxiliary Feedwater Flow To SG C	5.1.2	
1305	ALFT0009	Auxiliary Feedwater Flow To SG B	5.1.2	
1328	ALHV0011	MDAFP A Discharge to SG C Isolation Valve	5.1.2	
1328	ALHV0009	MDAFP A Discharge to SG B Isolation Valve	5.1.2	
1330	ALHV0010	TDAFP Discharge to SG B	5.1.2	
1330	ALHV0012	TDAFP Discharge to SG C	5.1.2	
1330	ALHY0010	ALHV0010 I/P Converter	5.1.2	
1330	ALHY0012	ALHV0012 I/P Converter	5.1.2	

5.1.1 Steam Generator Atmospheric Relief Valves

Pressure transmitters ABPT0002 and ABPT0003 and associated cables are located in fire area A-30. The effects of damage to these cables and components are described in the following paragraphs.

Cable 12ABI20FH provides a signal from pressure transmitter ABPT0002 to ARV ABPV0002 controller and opens the valve when steamline pressure reaches a designated setpoint. Damage to the pressure transmitter or cable due to a fire could cause a spurious high pressure signal which would open the ARV. If this occurs, operators can place ABPIC0002A in manual and control the ARV from the control room. Cables associated with the ARV controller I/P device (ABPY0002) do not run in area A-30.

Cable 13ABI20GE provides a signal from ARV ABPV0003 controller to pressure transducer ABPY0003. Cable 13ABI20GA provides a signal from ABPT0003 to ARV ABPV0003 controller. The transducer signals the position controller (ABZC0003) on ABPV0003 to open whenever steamline pressure reaches a designated setpoint. Damage to the cables due to a fire could cause a spurious signal which could open the ARV. Damage to cable 13ABI20GE could prevent manual operation of the valve from the control room. If the ARV spuriously opens, operators would have to close it using local controller ABFHC0003 in fire area A-23.

Based on the above discussion, steam generator ARVs ABPV0001, ABPV0002 and ABPV0004 can be controlled or closed from the control room. Steam generator ARV ABPV0003 may need to be controlled or closed using local controller ABFHC0003 in fire area A-23. Based on Section 5.1.2, the Train A MDAFP may not be available to supply steam generators B and C but the Train B MDAFP is available to supply steam generators A and D.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB20A, E-13AB20B, E-1F9101, M-12AB01

5.1.2 Auxiliary Feedwater

Several components and cables associated with Auxiliary Feedwater (AFW) are located in this area. The following paragraphs discuss the impact of damage to these cables and components on PFSSD.

Flow transmitters ALFT0009 and ALFT0011 and associated cables are located in this area. Damage to these components and cables could cause a spurious flow indication which could cause valves ALHV0009 and ALHV0011 to modulate or close, preventing adequate auxiliary feedwater flow from the Train A motor driven auxiliary feedwater pump (PAL01A) to steam generators B and C.

All four auxiliary feedwater to steam generators B and C supply valves (ALHV0009, ALHV0010, ALHV0011 and ALHV0012) are located in this area. In addition, power and control cables associated with these valves are run in this area. Damage to these cables and valves could prevent auxiliary feedwater flow from PAL01A and turbine driven auxiliary feedwater pump PAL02 to steam generators B and C.

Cables associated with ALHV0006 and ALHV0008 are run in this area. Damage to these cables could affect the operability of the valve and could prevent auxiliary feedwater flow from PAL02 to steam generators A and D.

The Train B motor driven auxiliary feedwater pump (PAL01B) is available to supply auxiliary feedwater to steam generators A and D via valves ALHV0005 and ALHV0007.

Cables associated with pressure transmitters ALPT0037, ALPT0038 and ALPT0039 are run in area A-30. Damage to these cables could cause a spurious low suction pressure (LSP) signal (2/3 logic) and initiate auxiliary feedwater suction swapover to the ESW system. This is acceptable for PFSSD since the ESW system is the safety related water source for AFW.

Based on the above discussion, the Train B motor driven auxiliary feedwater pump (PAL01B) is available to supply water to steam generators A and D. The suction source for AFW could swap to ESW due to a spurious LSP signal, but this will not adversely impact PFSSD. Based on Section 5.1.1, steam generator ARV ABPV0003 may need to be isolated using local controller ABFHC0003 but the remaining ARVs can be controlled or closed from the main control room.

References: E-15000, XX-E-013, E-13AL03A, E-13AL05A, E-13AL05B, E-13AL08, E-13AL09, E-1F9202, E-1F9203, E-1F9204, M-12AL01

5.2 PFSSD CABLE EVALUATION

Table A-30-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-30. The applicable evaluation section is also listed in Table A-30-4.

Table A-30-4
PFSSD Cables Located in Fire Area A-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ALI03AD	1305, 1328	ALHV0009	I	5.1.2	MDAFP A Discharge to SG B Iso Valve
11ALI03AE	1305, 1328	ALHV0009	I	5.1.2	MDAFP A Discharge to SG B Iso Valve
11ALI03AF	1305, 1328	ALHV0009	I	5.1.2	MDAFP A Discharge to SG B Iso Valve
11ALI03BD	1305, 1328	ALHV0011	I	5.1.2	MDAFP A Discharge to SG C Iso Valve
11ALI03BE	1305, 1328	ALHV0011	I	5.1.2	MDAFP A Discharge to SG C Iso Valve
11ALI03BF	1305, 1328	ALHV0011	I	5.1.2	MDAFP A Discharge to SG C Iso Valve
11ALI05AD	1305	ALHV0006	I	5.1.2	TDAFP Discharge to SG D (ALHY0006)
11ALI05AE	1305	ALHV0006	I	5.1.2	TDAFP Discharge to SG D
11ALI05AF	1305	ALHV0006	I	5.1.2	TDAFP Discharge to SG D
11ALI05BD	1305	ALHV0008	I	5.1.2	TDAFP Discharge to SG A (ALHY0008)
11ALI05BE	1305	ALHV0008	I	5.1.2	TDAFP Discharge to SG A
11ALI05BF	1305	ALHV0008	I	5.1.2	TDAFP Discharge to SG A
11ALI08AA	1305, 1328	ALPT0037	I	5.1.2	ESFAS AFW Low Suction Pressure Transmitter
11ALI09BA	1305	ALFT0009	I	5.1.2	Auxiliary Feedwater Flow To SG B
11ALI09CA	1305	ALFT0011	I	5.1.2	Auxiliary Feedwater Flow To SG C
11ALY09CE	1328	ALHV0009	P	5.1.2	MDAFP A Discharge to SG B
11ALY09DE	1328	ALHV0011	P	5.1.2	MDAFP A Discharge to SG C
12ABI20FH	1305	ABPV0002	I	5.1.1	SG B Steamline Pressure (ABPT0002)
12ALI08BA	1305, 1330	ALPT0038	I	5.1.2	ESFAS AFW Low Suction Pressure Transmitter
13ABI20GA	1305	ABPV0003	I	5.1.1	SG C Steamline Pressure (ABPT0003)
13ABI20GE	1305	ABPV0003	I	5.1.1	SG C Steamline Pressure I/P (ABPY0003)
13ABI21PA	1305	ABPT0526	I	5.2.1	SG B Steamline Pressure Transmitter
13ABI21TA	1305	ABPT0536	I	5.2.1	SG C Steamline Pressure Transmitter

Table A-30-4
PFSSD Cables Located in Fire Area A-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALI05AG	1305, 1330	ALHV0010	I	5.1.2	TDAFP Discharge to SG B Iso Valve
14ALI05AH	1305, 1330	ALHV0010	I	5.1.2	TDAFP Discharge to SG B Iso Valve
14ALI05AJ	1305, 1330	ALHV0010	I	5.1.2	TDAFP Discharge to SG B (ALHY0010)
14ALI05BD	1305, 1330	ALHV0012	I	5.1.2	TDAFP Discharge to SG C (ALHY0012)
14ALI05BE	1305, 1330	ALHV0012	I	5.1.2	TDAFP Discharge to SG C Iso Valve
14ALI05BF	1305, 1330	ALHV0012	I	5.1.2	TDAFP Discharge to SG C Iso Valve
14ALI08CA	1305, 1330	ALPT0039	I	5.1.2	ESFAS AFW Low Suction Pressure Transmitter
15BMK06AA	1305	BMHV0001	C	5.2.2	SG A to Blowdown Flash Tank Isolation Valve
15BMK06BA	1305	BMHV0002	C	5.2.2	SG B to Blowdown Flash Tank Isolation Valve
15BMK06CA	1305	BMHV0003	C	5.2.2	SG C to Blowdown Flash Tank Isolation Valve
15BMK06DA	1305	BMHV0004	C	5.2.2	SG D to Blowdown Flash Tank Isolation Valve

5.2.1 Safety Injection

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. This condition is not desirable for PFSSD at Wolf Creek.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and, ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Cables associated with steam line pressure transmitters ABPT0526 and ABPT0536 are run in area A-30. Cables for the remaining components identified above are unaffected by a fire in area A-30. Consequently, a spurious SIS will not occur in the event of a fire in area A-30.

References: E-15000, XX-E-013, E-13AB21, E-1F9431, E-1F9432, M-12AB01

5.2.2 Steam Generator Blowdown to Blowdown Flash Tank Isolation Valves

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown. The valves are air operated and each valve is controlled by three solenoid valves. All three solenoid valves are required to be energized to open the valve. If any one solenoid is de-energized, the associated valve will close or remain closed. Only two of the three solenoids for each valve are considered in the PFSSD analysis, so the third solenoid is assumed energized throughout the event.

Cables 15BMK06AA, 15BMK06BA, 15BMK06CA and 15BMK06DA, associated with blowdown valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004, are run in area A-30. These cables are associated with the solenoid valve for the handswitches located on the BM157 panel in the radwaste control room. Damage to these cables will have no adverse impact on the ability to close the blowdown valves using the handswitches in the main control room.

Based on the above discussion, steam generator blowdown to blowdown flash tank valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004 can be closed using hand switches BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A, respectively, in the main control room.

References: E-15000, XX-E-013, E-13BM06A, E-13BM06D, E-1F9101, M-12BM01

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1.0 GENERAL AREA DESCRIPTION

Fire area A-33 is located on the 1989 elevation of the Auxiliary Building and includes the rooms listed in Table A-33-1.

Table A-33-1
Rooms Located in Fire Area A-33

ROOM #	DESCRIPTION
1206	Auxiliary Feedwater Pipe Chase West
1207	Auxiliary Feedwater Pipe Chase East

Fire area A-33 is protected with an automatic wet-pipe sprinkler system. In addition, automatic fire detection is installed throughout. The automatic suppression and detection system meets the requirements of 10CFR50, Appendix R, Section III.G.2.c.

Circuits associated with redundant success paths are run through this area. In some cases, one success path is protected with a raceway fire barrier material meeting the requirements for a 1-hour fire rating. The 1-hour electrical raceway fire wrap in addition to automatic fire suppression and detection, meets Wolf Creek's commitments to 10CFR50, Appendix R Section III.G.2(c) and provides reasonable assurance that a fire in area A-33 will not impact safe shutdown.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-33-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-33-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-33

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
AL	Aux. Feedwater System	H, P	The TDAFP is available taking suction from the CST or ESW, depending on the location of the postulated fire. Valves ALHV0010 and ALHV0012 may be affected, preventing flow from the TDAFP to SGs B and C. Flow from the TDAFP to SGs A and D is available through valves ALHV0006 and ALHV0008. Valves ALHV0009 and ALHV0011 may lose power, causing loss of control of AFW from Train A MDAFP to SGs B and C. The TDAFP is available to supply all four steam generators.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blowdown system are satisfied. Steam generator blowdown is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A, located on the RL024 panel in the main control room.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.

Table A-33-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-33

System	System Name	PFSSD Function*	Comments
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
FC	Auxiliary Turbines	R, H, P	The TDAFP is available.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.

Table A-33-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-33

System	System Name	PFSSD Function*	Comments
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.

Table A-33-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-33			
System	**System Name**	**PFSSD Function***	**Comments**
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-33.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area A-33. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Auxiliary Feedwater Lineup

Both motor driven auxiliary feedwater pumps may be unavailable. Turbine driven auxiliary feedwater to steam generators B and C may be affected. Align the Turbine Driven Auxiliary Feedwater Pump (TDAFP) to steam generators A and D using either train of ESW or the CST as the suction source.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post Fire Safe Shutdown is assured for a fire in area A-33. Redundant capability exists and is unaffected by a fire in area A-33.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-33.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-33

PFSSD components (S. in E-15000) located in fire area A-33 are shown in Table A-33-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-33-3.

Table A-33-3
PFSSD Equipment Located in Fire Area A-33

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1206	ALHV0030	ESW To Mtr Driven Aux Feedwater Pump B	5.2.1	
1206	ALHV0031	ESW To Mtr Driven Aux Feedwater Pump A	5.2.1	
1206	ALHV0034	CST To Mtr Driven Aux Feedwater Pump B	5.2.1	
1206	ALHV0035	CST To Mtr Driven Aux Feedwater Pump A	5.2.1	
1207	ALHV0032	TDAFW Pump Suction From ESW A	5.2.1	
1207	ALHV0033	TDAFW Pump Suction From ESW B	5.2.1	
1207	ALHV0036	TDAFW Pump Suction From CST	5.2.1	
1207	ALPT0037	ESFAS Low Suction Pressure	5.1.1	
1207	ALPT0038	ESFAS Low Suction Pressure	5.1.1	
1207	ALPT0039	ESFAS Low Suction Pressure	5.1.1	
1207	FCFV0310	AFWP Turbine Drain Trap To Condenser Iso Vlv	5.1.2	
1207	FCFY0310	FCFV310 Solenoid Valve	5.1.2	

5.1.1 Condensate Storage Tank Pressure Transmitters

Condensate storage tank (CST) pressure transmitters ALPT0037, ALPT0038 and ALPT0039 are included in the PFSSD design because they initiate swapover to ESW upon 2/3 low CST pressure indications. A spurious low CST pressure due to fire damage to cables associated with two of these pressure transmitters will swap the water source to ESW.

All three CST pressure transmitters, and associated cables, are located in fire area A-33 within approximately 10 feet of one another. Damage to these transmitters could initiate a spurious swapover from CST to ESW, or prevent an automatic swapover from occurring. A spurious swapover will not impact PFSSD because at least one ESW to TDAFP suction valve is available, as discussed in Section 5.2.1. Damage to the transmitters and associated cables in a manner that prevents automatic swapover is mitigated by manually aligning the ESW source after indication that the CST level or TDAFP suction pressure is low. Level transmitter APLT0004, although not a PFSSD component, is available to provide CST level indication in the control room. Circuits associated with this level transmitter do not run through area A-33. Pressure transmitter ALPT0026, located on the TDAFP suction line, is available if a fire occurs in area A-33 and can be used by operators to establish suction pressure on the TDAFP and initiate manual swapover to ESW if necessary.

Based on the above discussion, damage to all three CST pressure transmitters will have no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-1F9202

5.1.2 TDAFP Drain Trap Isolation Valve

Valve FCFV0310 is an isolation valve on the 1-inch steam trap line associated with the TDAFP. Solenoid valve FCFY0310 controls the position of valve FCFV0310. PFSSD requires this valve to be closed to prevent uncontrolled loss of steam through this flow path.

Cable 14FCK21AA is a control cable associated with valve FCFV0310. Inter or intra-cable hot shorts could cause the valve to spuriously open. There are no energized 125 VDC cables in the same conduit as cable 14FCK21AA, so inter-cable hot shorts causing the valve to open are not possible. An intra-cable hot short from conductor 2 to conductor 1 will energize the solenoid and open the valve. This can be mitigated by depressing the close pushbutton on hand switch FCHIS0310. However, since this is a momantary contact switch, the operator would have to maintain the the button in the depressed position.

Uncontrolled blowdown through this 1-inch line is bounded by the main steam line break analysis and loss of steam through this line will not result in uncontrolled cooldown. Therefore, if the valve remains open, PFSSD is assured.

References: E-15000, XX-E-013, E-13FC21, E-1F9202, M-12FC02

5.2 PFSSD CABLE EVALUATION

Table A-33-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-33. The applicable evaluation section is also listed in Table A-33-4.

Table A-33-4
PFSSD Cables Located in Fire Area A-33

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ALB01AA	1206	PAL01A	P	5.2.1	Train A Motor Driven Auxiliary Feed Pump
11ALG02BA	1206, 1207	ALHV0035	P	5.2.1	CST To Mtr Driven Aux Feedwater Pump A
11ALG02BB	1206, 1207	ALHV0035	C	5.2.1	CST To Mtr Driven Aux Feedwater Pump A
11ALG02CA	1206, 1207	ALHV0036	P	5.2.1	TDAFW Pump Suction From CST
11ALG02CB	1206, 1207	ALHV0036	C	5.2.1	TDAFW Pump Suction From CST
11ALG04BA	1206, 1207	ALHV0031	P	5.2.1	ESW To Mtr Driven Aux Feedwater Pump A
11ALG04BB	1206, 1207	ALHV0031	C	5.2.1	ESW To Mtr Driven Aux Feedwater Pump A
11ALG04CA	1206, 1207	ALHV0032	P	5.2.1	TDAFW Pump Suction From ESW A - 1-hr fire wrap installed
11ALG04CB	1206, 1207	ALHV0032	C	5.2.1	TDAFW Pump Suction From ESW A - 1-hr fire wrap installed
11ALI08AA	1207	ALPT0037	I	5.1.1	ESFAS Low Suction Pressure
11ALY09CE	1206, 1207	ALHV0009	P	5.2.1	MDAFP A Discharge to SG B
11ALY09DE	1206, 1207	ALHV0011	P	5.2.1	MDAFP A Discharge to SG C
12ALI08BA	1207	ALPT0038	I	5.1.1	ESFAS Low Suction Pressure
14ALB01BA	1206	PAL01B	P	5.2.1	Train B Motor Driven Auxiliary Feed Pump
14ALG02AA	1206	ALHV0034	P	5.2.1	CST To Mtr Driven Aux Feedwater Pump B
14ALG02AB	1206	ALHV0034	C	5.2.1	CST To Mtr Driven Aux Feedwater Pump B
14ALG02AJ	1206	ALHV0034	I	5.2.1	CST To Mtr Driven Aux Feedwater Pump B
14ALG04AA	1206	ALHV0030	P	5.2.1	ESW To Mtr Driven Aux Feedwater Pump B
14ALG04AB	1206	ALHV0030	C	5.2.1	ESW To Mtr Driven Aux Feedwater Pump B
14ALG04AJ	1206	ALHV0030	I	5.2.1	ESW To Mtr Driven Aux Feedwater Pump B
14ALG04DA	1206, 1207	ALHV0033	P	5.2.1	TDAFW Pump Suction From ESW B

Table A-33-4
PFSSD Cables Located in Fire Area A-33

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALG04DB	1206, 1207	ALHV0033	C	5.2.1	TDAFW Pump Suction From ESW B
14ALG04DJ	1206, 1207	ALHV0033	I	5.2.1	TDAFW Pump Suction From ESW B
14ALI05AG	1207	ALHV0010	I	5.2.2	TDAFP to SG B
14ALI05AH	1207	ALHV0010	I	5.2.2	TDAFP to SG B
14ALI05AJ	1207	ALHV0010	I	5.2.2	TDAFP to SG B
14ALI05BD	1207	ALHV0012	I	5.2.2	TDAFP to SG C
14ALI05BE	1207	ALHV0012	I	5.2.2	TDAFP to SG C
14ALI05BF	1207	ALHV0012	I	5.2.2	TDAFP to SG C
14ALI08CA	1207	ALPT0039	I	5.1.1	ESFAS Low Suction Pressure
14FCK21AA	1206, 1207	FCFV0310	C	5.1.2	AFWP Turbine Drain Trap To Cond Iso Vlv
15BMK06AA	1207	BMHV0001	C	5.2.3	SG A Blowdown to Flash Tank
15BMK06BA	1207	BMHV0002	C	5.2.3	SG B Blowdown to Flash Tank
15BMK06CA	1207	BMHV0003	C	5.2.3	SG C Blowdown to Flash Tank
15BMK06DA	1207	BMHV0004	C	5.2.3	SG D Blowdown to Flash Tank

5.2.1 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire AFW demand to achieve cold shutdown.

Motor operated valves (MOVs) in the system allow operators to line up the auxiliary feedwater system as required to achieve and maintain safe shutdown. Damage to the MOV circuits due to a fire could prevent operators from lining up the system from the control room.

Cable 11ALB01AA is a power cable for the Train A motor driven auxiliary feedwater pump. Damage to this cable will prevent operation of PAL01A. Cable 14ALB01BA is a power cable for the Train B motor driven auxiliary feedwater pump. Damage to this cable will prevent operation of PAL01B.

Cable 11ALY09CE is a power cable associated with the Modutronic controller on valve ALHV0009 (Train A MDAFP to Steam Generator B). Damage to this cable could disable power to the controller and prevent flow control from the Train A MDAFP to SG B. As stated above, the Train A MDAFP may not be available, therefore valve ALHV0009 is not required if a fire occurs in this area.

Cable 11ALY09DE is a power cable associated with the Modutronic controller on valve ALHV0011 (Train A MDAFP to Steam Generator C). Damage to this cable could disable power to the controller and prevent flow control from the Train A MDAFP to SG C. As stated above, the Train A MDAFP may not be available, therefore valve ALHV0011 is not required if a fire occurs in this area.

Fire area A-33 contains all 7 suction isolation valves and associated cables for all three auxiliary feedwater pumps. These valves control the suction source from either the essential service water system or the condensate storage tank (CST) to the auxiliary feedwater pumps. Each of these valves is discussed in the following paragraphs.

Valve ALHV0030 is a normally closed suction isolation valve from ESW to Train B motor driven auxiliary feedwater pump. Cables 14ALG04AA, 14ALG04AB and 14ALG04AJ are power, control and indication cables, respectively, associated with this valve and run through area A-33. Damage to cables 14ALG04AA and 14ALG04AB due to a fire may result in the failure of valve ALHV0030 to open in response to an automatic or manual open signal. Damage to cable 14ALG04AJ may result in a loss of valve position indication on RP118B, which has no impact on PFSSD. Loss of capability to control this valve has no impact on PFSSD due to the availability of the TDAFP and associated valves.

Valve ALHV0031 is a normally closed suction isolation valve from ESW to Train A motor driven auxiliary feedwater pump. Cables 11ALG04BA and 11ALG04BB are power and control cables, respectively, associated with this valve and run through area A-33. Damage to these cables due to a fire may result in the failure of valve ALHV0031 to open in response to an automatic or manual open signal and may result in loss of valve position indication in the control room. Loss of capability to control this valve has no impact on PFSSD due to the availability of the TDAFP and associated valves.

Valve ALHV0034 is a normally open suction isolation valve from CST to Train B motor driven auxiliary feedwater pump. Cables 14ALG02AA, 14ALG02AB and 14ALG02AJ are power, control and indication cables, respectively, associated with this valve. Damage to cable 14ALG02AA will most likely result in the valve failing in the as-is open position. A 3-phase hot short on this cable is not postulated since the valve is not at a high-low pressure interface. Damage to cable 14ALG02AB will most likely result in the valve failing in the as-is open position. However, a short between conductors X4 and 2 will bypass the open position switch (ZS/11) and torque switch (WS/18) resulting in high opening torque and possible damage to the valve operator. If this occurs, the protective fuses on the control power transformer will blow, protecting the operator from further damage. Damage to cable 14ALG02AJ may result in a loss of valve position indication on RP118B, which has no impact on PFSSD. Loss of capability to control this valve has no impact on PFSSD due to the availability of the TDAFP and associated valves.

Valve ALHV0035 is a normally open suction isolation valve from CST to Train A motor driven auxiliary feedwater pump. Cables 11ALG02BA and 11ALG02BB are power and control cables, respectively, associated with this valve. Damage to cable 11ALG02BA will most likely result in the valve failing in the as-is open position. A 3-phase hot short on this cable is not postulated since the valve is not at a high-low pressure interface. Damage to cable 11ALG02BB will most likely result in the valve failing in the as-is open position. However, a short between conductors X1 and 2 will bypass the open position switch (ZS/5) and torque switch (WS/18) resulting in high opening torque and possible damage to the valve operator. If this occurs, the protective fuses on the control power transformer will blow, protecting the operator from further damage. Loss of capability to control this valve has no impact on PFSSD due to the availability of the TDAFP and associated valves.

Valve ALHV0032 is a normally closed suction isolation valve from ESW to the TDAFP. Cables 11ALG04CA and 11ALG04CB are power and control cables, respectively, associated with this valve. Damage to these cables due to a fire may result in the failure of valve ALHV0032 to open in response to an automatic or manual open signal and may result in loss of valve position indication in the control room. The cables are enclosed in conduit which has been wrapped with a qualified 1-hour fire resistant material. The valve and operator are not enclosed in 1-hour material but are separated from redundant valve ALHV0033 by at least 20 feet with no intervening combustibles. In addition, the area is protected with automatic fire suppression and detection throughout. This configuration meets the Wolf Creek commitments to 10CFR50, Appendix R and is, therefore, acceptable.

Valve ALHV0033 is a normally closed suction isolation valve from ESW to the TDAFP. Cables 14ALG04DA, 14ALG04DB and 14ALG04DJ are power, control and indication cables, respectively, associated with this valve. Damage to cables 14ALG04DA and 14ALG04DB due to a fire may result in the failure of valve ALHV0033 to open in response to an automatic or manual open signal. Damage to cable 14ALG04DJ may result in a loss of valve position indication on RP118B, which has no impact on PFSSD. Redundant valve ALHV0032 and associated cables are separated by at least 20 feet with no intervening combustibles or else the cables are protected with a qualified 1-hour fire-resistant material. In addition, the area is protected with automatic fire suppression and detection throughout. This configuration meets the Wolf Creek commitments to 10CFR50, Appendix R and is, therefore, acceptable.

Valve ALHV0036 is a normally open suction isolation valve from CST to the TDAFP. The PFSSD design requires this valve to be closed when using ESW as a suction source. Cables 11ALG02CA and 11ALG02CB are power and control cables, respectively, associated with this valve. The cables are enclosed in conduit which has been wrapped with a qualified 1-hour fire resistant material. The valve and operator are not enclosed in 1-hour material and are separated from redundant valves ALHV0032 and ALHV0033 by approximately 13 feet and 7 ½ feet, respectively with no intervening combustibles. In addition, the area is protected with automatic fire suppression and detection throughout. Depending on the location of the fire,

valve ALHV0036 may be available to ensure CST suction to the TDAFP. However, PFSSD is assured using the ESW suction source via valve ALHV0032 or ALHV0033.

Cables associated with the turbine driven auxiliary feedwater pump (TDAFP) are located in a separate fire area and are unaffected by a fire in area A-33. The TDAFP is redundant to both motor driven auxiliary feedwater pumps and is unaffected by a fire in area A-33. Therefore, the TDAFWP is available to provide feedwater to the steam generators in the event of a fire in A-33.

Based on the above discussion, both motor driven auxiliary feedwater pumps may be unavailable if a fire occurs in this area but the turbine driven auxiliary feedwater pump is unaffected and is available to supply all four steam generators. Depending on the location of the postulated fire, either the CST or the ESW system is available to supply suction to the TDAFP.

References: E-15000, XX-E-013, E-13AL01A, E-13AL01B, E-13AL02A, E-13AL02B, E-13AL04A, E-13AL04B, E-13AL09, E-13NB01, E-13NB04, E-1F9202, E-1F9204, E-1R1153, M-12AL01

5.2.2 TDAFP To Steam Generator Isolation Valves

PFSSD requires one auxiliary feedwater pump supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

Valve ALHV0010 is an isolation valve on the TDAFP discharge to Steam Generator B. Cables 14ALI05AG, 14ALI05AH and 14ALI05AJ are instrumentation cables associated with this valve. Damage to these cables could cause a loss of control of valve ALHV0010 and prevent auxiliary feedwater flow to SG B.

Valve ALHV0012 is an isolation valve on the TDAFP discharge to Steam Generator C. Cables 14ALI05BD, 14ALI05BE and 14ALI05BF are instrumentation cables associated with this valve. Damage to these cables could cause a loss of control of valve ALHV0012 and prevent auxiliary feedwater flow to SG C.

Valves ALHV0006 and ALHV0008 are unaffected by a fire in area A-33. These valves control water from the TDAFP to SGs D and A, respectively. Therefore, PFSSD is assured based on the ability to supply feedwater to SGs A and D using the TDAFP.

References: E-15000, XX-E-013, E-13AL05A, E-13AL05B, E-1F9203, M-12AL01

5.2.3 Steam Generator Blowdown to Blowdown Flash Tank Isolation Valves

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown.

Cables 15BMK06AA, 15BMK06BA, 15BMK06CA and 15BMK06DA are control cables associated with the BM157 panel mounted hand switches for each of the BMHV valves. Damage to these cables could impact the ability to close the valves from BM157 in the Radwaste Control Room.

The normal means of closing the blowdown valves, using the RL024 mounted hand switches in the Main Control Room, remains available. Therefore, a fire in area A-33 will not prevent the closure of valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004.

References: E-15000, XX-E-013, E-13BM06D, E-1F9101, M-12BM01

FIRE AREA A-34

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1.0 GENERAL AREA DESCRIPTION

Fire area A-34 is located on the 2000 elevation of the Auxiliary Building and includes the rooms listed in Table A-34-1.

Table A-34-1
Rooms Located in Fire Area A34

ROOM #	ROOM #
1316	Seal Water Heat Exchanger Valve Compartment
1317	Seal Water Heat Exchanger Room

There is no automatic fire suppression or detection installed. The area is separated from all adjacent areas by minimum 3-hour fire rated construction meeting the requirements of 10 CFR 50, Appendix R.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table A-34-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table A-34-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-34

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
BG	Chemical and Volume Control System	R, M, S	VCT level transmitter BGLT0185 may be affected. VCT level indication is available using BGLI0112
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.

Table A-34-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-34

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.

Table A-34-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-34

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.

Table A-34-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area A-34

System	System Name	PFSSD Function*	Comments
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area A-34.

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

There are no operator actions specific to PFSSD either inside or outside the control room to achieve and maintain safe shutdown in the event of a fire in this area.

4.0 CONCLUSION

Redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area A-34.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA A-34

PFSSD components (S. in E-15000) located in fire area A-34 are shown in Table A-34-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table A-34-3.

Table A-34-3
PFSSD Equipment Located in Fire Area A-34

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
1316	BGLT0185	VCT Level Transmitter	5.1.1	
1317	TB13208	Terminal Box for BGLT0185	5.1.1	
1317	EBG03	Seal Water Heat Exchanger	5.1.2	

5.1.1 VCT Level Indication

Volume Control Tank (VCT) level transmitter BGLT0185 is included in the PFSSD design because it initiates refueling water sequence upon sensing low-low water level in the VCT. The transmitter also provides VCT level indication in the control room. BGLT0185 uses sealed capillary tubing as instrument lines. Sealed capillary tubing can be affected by the heat generated by a fire. Therefore, the instrument tubing for this instrument is also considered to be damaged by a fire.

Damage to the VCT level transmitter, the instrument tubing or associated circuits could cause one or more of the following to occur:

1. Loss of VCT level indication in the Control Room
2. False low-low level in the VCT, initiating swap-over to the RWST
3. Inability to sense low-low level in the VCT, resulting in a loss of suction to the CCPs.

Redundant VCT level transmitter BGLT0112, and associated cables, is located in a separated fire area and is unaffected by a fire in fire area A-34. Therefore, VCT level indication remains available in the event of a fire in this area.

A sporadic low-low VCT level signal caused by damage to BGLT0185 and/or associated cables will start the RWST sequence, which is the desired PFSSD lineup. Therefore, this will not prevent PFSSD in the event of a fire in this area.

If transmitter BGLT0185 and associated cables are damaged, redundant VCT level transmitter BGLT0112 remains available to initiate RWST sequence upon low-low level in the VCT.

Based on the above discussion, damage to BGLT0185 and/or associated circuits will not prevent safe shutdown in the event of a fire in area A-34.

References: E-15000, XX-E-013, E-13BG12, E-13BG12A, E-13BG51, E-1F9102, E-1F9302, E-1R1323C and E-1R1323D, M-12BG03

5.1.2 Seal Water Heat Exchanger

The seal water heat exchanger is required for PFSSD to maintain charging pump suction temperatures below acceptable limits. The seal water heat exchanger cools the water returning from the reactor coolant pump seals prior to the seal return water entering the CCP suction header. In addition, the seal water heat exchanger cools the recirculating water from the CCP discharge when the CCPs are operating on minimum flow.

The seal water heat exchanger is located in fire area A-34. There are no components on the heat exchanger that will fail in the event of a fire. Therefore, the heat exchanger will remain operable if a fire occurs in area A-34.

References: E-15000, XX-E-013, E-1F9303, M-12BG03

5.2 PFSSD CABLE EVALUATION

Table A-34-4 lists all the PFSSD cables (S. in E-15000) located in fire area A-34. Since all PFSSD cables terminate at the associated PFSSD equipment in this fire area, the cable evaluation is included in Section 5.1.

Table A-34-4
PFSSD Cables Located in Fire Area A-34

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BGI51DA	1317	BGLT0185	I	5.1.1	VCT Level Transmitter
14BGI51DB	1316, 1317	BGLT0185	I	5.1.1	VCT Level Transmitter

FIRE AREA AB-1

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1.0 GENERAL AREA DESCRIPTION

Fire area AB-1 includes the Auxiliary Boiler room located on the South side of the Turbine Building and includes the room listed in Table AB-1-1.

Table AB-1-1
Rooms Located in Fire Area AB-1

ROOM #	DESCRIPTION
4315	Auxiliary Boiler Room

Fire area AB-1 has no installed automatic fire suppression system. The area is provided with automatic flame detection.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Fire area AB-1 contains no post-fire safe shutdown cables or equipment. Therefore, both trains of PFSSD equipment are available if a fire occurs in this area.

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

Not applicable to fire area AB-1.

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

A detailed analysis is not required since this area contains no PFSSD cables or components.

FIRE AREA C-1

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1.0 GENERAL AREA DESCRIPTION

Fire area C-1 is located on the 1974 elevation of the Control Building and includes the rooms listed in Table C-1-1.

Table C-1-1
Rooms Located in Fire Area C-1

ROOM #	DESCRIPTION
3101	Essential Service Water Pipe Space
3104	Stairway from Access Control

Fire area C-1 is protected with an automatic wet-pipe sprinkler system. In addition, automatic fire detection is installed in the area of the motor-operated ESW valves. A minimum 20 foot combustible and fire hazard free zone separates the north and south portions of this area. Redundant PFSSD components and cables are located at least 20 feet apart, except where identified in this report, and are bounded by the minimum 20 foot combustible and fire hazard free zone. The automatic suppression and detection system and 20 foot combustible free zone meets the intent of 10CFR50, Appendix R, Section III.G.2.b.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-1-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-1

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
BG	Chemical and Volume Control System	R, M, S	A fire in the South end, including room 3104, will affect Train B CCP. Train A CCP remains available. Use the appropriate train of CCP depending on the location of the fire and the available train of ESW.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
BN	Borated Refueling Water Storage System	R, M, H	Valve BNLCV0112E may not respond if a fire occurs on the South end of this area. Valve BNHV8812B may not respond if a fire occurs on the South end of this area.
EF	Essential Service Water System	H, S	Both trains of ESW Flow Transmitters (EFFT0053 and EFFT0054) may be lost. Use alternate diagnostic instrumentation on operating Train components. A fire in the North end will affect Train A ESW but Train B will be available. A fire in the South end will affect Train B ESW but Train A will be available.
EG	Component Cooling Water System	S	CCW is not directly impacted by a fire in area C-1. Use the appropriate train of CCW depending on the location of the fire and the available train of ESW.
EJ	Residual Heat Removal System	M, H, P	If a fire occurs on the South end, RHR Train B may be unavailable. Use RHR Train A.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.

Table C-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-1

System	System Name	PFSSD Function*	Comments
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
GD	ESW Pump House HVAC	S	A fire on the South end may affect Train B ESW pump room ventilation. Train A ESW pump room ventilation is available. A fire on the North end does not affect Train A or Train B ESW pump room ventilation.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
GL	Auxiliary Building HVAC	S	If a fire occurs on the South end, Train B CCP and RHR pump room coolers may not be available. Train A CCP and RHR pump room coolers remain available.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
GN	Containment Coolers	S	Use the appropriate train of containment coolers depending on the location of the fire and the available train of ESW.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.

Table C-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-1

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.

Table C-1-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-1			
System	**System Name**	**PFSSD Function***	**Comments**
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-1.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-1. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 ESW System Lineup

If the fire is on the South end, Train B ESW may be affected. If this occurs, line up Train A ESW using normal operating procedures. If the fire is on the North end, Train A ESW may be affected. If this occurs, line up Train B ESW using normal operating procedures.

3.2.2 Component Cooling Water

Depending on the location of the fire and the operating CCW train at the time of the fire, it may be necessary to swap to the opposite CCW Train if ESW is lost.

3.2.3 Refueling Water Storage Tank

If the fire is on the South end, valve BNLCV0112E may not respond. Line up the RWST to the charging header by opening BNHV0112D using BNHIS0112D.

3.2.4 Charging Pump Mini-Flow Valves

If the fire is on the South end, Valve BGHV8111 may be affected. Train A CCP mini-flow valve BGHV8110 is unaffected and can be lined up using BGHIS8110.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR System Lineup

Train A RHR is assured if the fire is on the South end of this area. Train B RHR is assured if the fire is on the North end of this area. A fire on the South end could affect BNHV8812B but BNHV8812A is unaffected.

4.0 CONCLUSION

Redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-1.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-1

PFSSD components (S. in E-15000) located in fire area C-1 are shown in Table C-1-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table C-1-3.

Table C-1-3
PFSSD Equipment Located in Fire Area C-1

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
3101	EFFT0053	ESW Train A To Power Block Flow Transmitter	5.1.1	
3101	EFFT0054	ESW Train B To Power Block Flow Transmitter	5.1.1	
3101	EFHV0023	ESW A/Service Water Cross Connect Valve	5.1.2	
3101	EFHV0024	ESW B/Service Water Cross Connect Valve	5.1.2	
3101	EFHV0025	ESW A/Service Water Cross Connect Valve	5.1.2	
3101	EFHV0026	ESW B/Service Water Cross Connect Valve	5.1.2	
3101	EFHV0037	ESW A To Ultimate Heat Sink Isolation Valve	5.1.2	
3101	EFHV0038	ESW B To Ultimate Heat Sink Isolation Valve	5.1.2	
3101	EFHV0039	ESW A To Service Water Isolation Valve	5.1.2	
3101	EFHV0040	ESW B To Service Water Isolation Valve	5.1.2	
3101	EFHV0041	ESW A To Service Water Isolation Valve	5.1.2	
3101	EFHV0042	ESW B To Service Water Isolation Valve	5.1.2	
3101	EFV0470	ESW to Service Water Train A Cross Connect Check Valve	5.1.2	
3101	EFV0471	ESW to Service Water Train B Cross Connect Check Valve	5.1.2	
3102	TB32103	Terminal Box	5.1.3	

5.1.1 Essential Service Water (ESW) Flow Transmitters

Flow transmitters EFFT0053 (Train A) and EFFT0054 (Train B) are included in the PFSSD design to provide diagnostic instrumentation of ESW system operation. The associated flow indicators are located on panel RL019 in the main control room and allow operators to ensure adequate ESW flow on the operating train. The transmitters have no interlocks that would prevent operation of other PFSSD components if damaged by the fire.

The flow transmitters are physically separated by a distance of 17'-0". Cables 11EFI11EA and 14EFI11FA, associated with these transmitters, are separated by no less than 17'-0". The horizontal separation provided does not meet the requirements of 10CFR50, Appendix R, Section III.G.2, which requires more than 20 feet of separation between redundant PFSSD components.

Loss of both flow transmitters due to a fire will have no impact on the operation of the required ESW train. The only purpose of the transmitters is to provide flow indication to the operators in the control room when the ESW system is operating. In the event a fire renders both transmitters inoperable, alternate indication is available to ensure ESW flow. Alternate indication includes any available instrumentation on individual PFSSD components served by the ESW system.

References: E-15000, XX-E-013, E-13EF11, E-1R3112, M-12EF01

5.1.2 ESW/Service Water Valves

The PFSSD methodology credits ESW as the source of service water to essential components. In order to ensure successful operation of the system, the control valves need to be aligned properly. A number of valves associated with the service water and ESW systems are located in area C-1. Depending on the location of the fire, either Train A ESW or Train B ESW will need to be aligned.

Valves EFHV0023 and EFHV0025 are normally open series valves from the service water system to the Train A ESW header. When operating Train A ESW system, one of these valves is required to be closed or check valve EFV0470 is required to be closed to prevent flow diversion to the service water piping. Per Assumption 3-A-24 in calculation XX-E-013 check valves are assumed to close in the direction of potential flow diversion. Therefore, there is reasonable assurance that the check valve will prevent flow diversion. Furthermore, motor operated valves EFHV0023 and EFHV0025 are separated by more than 20 feet of horizontal separation with no intervening combustibles or fire hazards. Cables 11EFG02AA and 11EFG02AB are power and control cables, respectively, associated with valve EFHV0023. Cables 14EFG02CA and 14EFG02CB are power and control cables, respectively, associated with valve EFHV0025. Cables associated with each valve are separated by more than 20 feet of horizontal separation with no intervening combustibles or fire hazards. The physical separation, along with automatic fire suppression and detection in the area, meets the requirements of 10CFR50, Appendix R, Section III.G.2 and is therefore acceptable. In the event that the check valve fails, one of the two MOVs will be available to isolate ESW from service water.

Valves EFHV0024 and EFHV0026 are normally open series valves from the service water system to the Train B ESW header. When operating Train B ESW system, one of these valves is required to be closed or check valve EFV0471 is required to be closed to prevent flow diversion to the service water piping. Per Assumption 3-A-24 in calculation XX-E-013 check valves are assumed to close in the direction of potential flow diversion. Therefore, there is reasonable assurance that the check valve will prevent flow diversion. Furthermore, motor operated valves EFHV0024 and EFHV0026 are separated by more than 20 feet of horizontal separation with no intervening combustibles or fire hazards. Cables 11EFG02BA and

11EFG02BB are power and control cables, respectively, associated with valve EFHV0024. Cables 14EFG02DA and 14EFG02DB are power and control cables, respectively, associated with valve EFHV0026. Cables associated with each valve are separated by more than 20 feet of horizontal separation with no intervening combustibles or fire hazards. The separation, along with automatic fire suppression and detection in the area meets the requirements of 10CFR50, Appendix R, Section III.G.2 and is therefore acceptable. In the event that the check valve fails, one of the two MOVs will be available to isolate ESW from service water.

Valve EFHV0037 is a normally throttled valve installed on the Train A ESW to Ultimate Heat Sink (UHS) line. When shutting down after a fire using the A Train ESW, this valve is required to be open to ensure adequate return flow to the UHS. Cables 11EFG06AA and 11EFG06AB are power and control cables, respectively, associated with valve EFHV0037. Damage to the power cable will likely result in the valve failing as-is, which is acceptable for PFSSD. Damage to the control cable could result in the valve spuriously closing, which is not desired.

Valve EFHV0038 is a normally throttled valve installed on the Train B ESW to Ultimate Heat Sink (UHS) line. When shutting down after a fire using the B Train ESW, this valve is required to be open to ensure adequate return flow to the UHS. Cables 14EFG06BA and 14EFG06BB are power and control cables, respectively, associated with valve EFHV0038. Damage to the power cable will likely result in the valve failing as-is, which is acceptable for PFSSD. Damage to the control cable could result in the valve spuriously closing, which is not desired.

Valves EFHV0037 and EFHV0038 are separated by more than 20 feet of horizontal separation with no intervening combustibles or fire hazards. With one exception, cables associated with these valves are separated by more than 20 feet of horizontal separation with no intervening combustibles or fire hazards. The exception occurs in one location where the distance between conduit 131U3019 and 134U3003 is only 19’ - 11”, which does not meet the literal requirements of 10CFR50, Appendix R. The length of conduit within the 20 foot Appendix R separation zone is approximately one foot. Based on the absence of significant quantities of combustible materials and the presence of automatic suppression and detection in the area, there is reasonable assurance that PFSSD can be achieved.

Valves EFHV0039 and EFHV0041 are normally throttled series valves located on the return line from Train A ESW system to service water system. When operating Train A ESW system, one of these valves is required to be closed to prevent flow diversion to the service water piping. The valves and associated cables are located in area C-1 with more than 20 feet of horizontal separation and no intervening combustibles or fire hazards. Cables 14EFG03AA and 14EFG03AB are power and control cables, respectively, associated with valve EFHV0039. Cables 11EFG03CA and 11EFG03CB are power and control cables, respectively, associated with valve EFHV0041. Cables associated with each valve are separated by more than 20 feet of horizontal separation with no intervening combustibles or fire hazards. The separation, along with automatic fire suppression and detection in the area, meets the requirements of 10CFR50, Appendix R, Section III.G.2 and is therefore acceptable.

Valves EFHV0040 and EFHV0042 are normally throttled series valves located on the return line from Train B ESW system to service water system. When operating Train B ESW system, one of these valves is required to be closed to prevent flow diversion to the service water piping. The valves and associated cables are located in area C-1 with more than 20 feet of horizontal separation and no intervening combustibles or fire hazards. Cables 14EFG03BA and 14EFG03BB are power and control cables, respectively, associated with valve EFHV0040. Cables 11EFG03DA and 11EFG03DB are power and control cables, respectively, associated with valve EFHV0042. Cables associated with each valve are separated by more than 20 feet of horizontal separation with no intervening combustibles or fire hazards. The separation, along with automatic fire suppression and detection in the area, meets the requirements of 10CFR50, Appendix R, Section III.G.2 and is therefore acceptable.

Based on the above discussion, adequate separation exists between redundant valves and associated circuits such that there is reasonable assurance that a single fire in this area will not impair both trains of ESW. The horizontal separation and presence of automatic suppression and detection meets the intent of 10CFR50, Appendix R and is therefore acceptable.

References: E-15000, XX-E-013, E-13EF02, E-13EF02A, E-13EF03, E-13EF06, E-13EF06A, E-1F9402A, E-1F9402B, E-1R3112

5.1.3 ESW Pump Room Ventilation

Terminal box TB32103 is located in room 3104, which is the stairway from access control to the 1974 elevation of the Auxiliary Building. The terminal box contains cables (14EFG11SA, 14EFG11TA, 14GDG01BE and 14GDG01BH) associated with Train B ESW pump room supply fan CGD01B. Damage to these cables could prevent operating the supply fan using local control hand switch GDHS11 in room 3302. Cables associated with Train A ESW pump room supply fan CGD01A do not run through fire area C-1.

Cable 14GDY01BA is a control cable associated with Train B ESW pump room supply fan. Cable 14GDI04BA is an instrument cable associated with Train B ESW pump room temperature element GDTE0011. Damage to these cables could prevent automatic and manual operation of the Train B ESW pump room fan.

Cable 14GDI04BB is an instrument cable associated with Train B ESW pump room inlet damper actuator GDTZ0011A. Damage to this cable could prevent operation of the damper. Train A ESW pump room inlet damper actuator GDTZ0001A is unaffected by a fire in this area.

Cable 14GDI04BC is an instrument cable associated with Train B ESW pump room recirculation damper actuator GDTZ0011B. Damage to this cable could prevent operation of the damper. Train A ESW pump room recirculation damper actuator GDTZ0001B is unaffected by a fire in this area.

If a fire occurs on the North end of this fire area, cables 14EFG11SA, 14EFG11TA, 14GDG01BE, 14GDG01BH, 14GDI04BA, 14GDI04BB, 14GDI04BC and 14GDY01BA are unaffected due to 20 feet of horizontal separation with no intervening combustibles, suppression and detection. As discussed in Section 5.1.2, Train A components may be lost if a fire occurs in the North end. If this occurs, Train B ESW is available to ensure PFSSD.

If a fire occurs in the South end of this fire area, cables 14EFG11SA, 14EFG11TA, 14GDG01BE, 14GDG01BH, 14GDI04BA, 14GDI04BB, 14GDI04BC and 14GDY01BA and other Train B circuits may be affected. If this occurs, Train A ESW is available to ensure PFSSD.

Based on the above discussion, a fire in area C-1 will not prevent safe shutdown.

References: E-15000, XX-E-013, E-1F9443, E-K3GD01A, E-K3GD04A, E-K3EF11, E-1R3212, J-110-00569, M-K2GD01

5.2 PFSSD CABLE EVALUATION

Table C-1-4 lists all the PFSSD cables (S. in E-15000) located in fire area C-1. The applicable evaluation section is also listed in Table C-1-4.

Table C-1-4
PFSSD Cables Located in Fire Area C-1

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EFG02AA	3101	EFHV0023	P	5.1.2	ESW A/Service Water Cross Connect Valve
11EFG02AB	3101	EFHV0023	C	5.1.2	ESW A/Service Water Cross Connect Valve
11EFG02BA	3101	EFHV0024	P	5.1.2	ESW B/Service Water Cross Connect Valve
11EFG02BB	3101	EFHV0024	C	5.1.2	ESW B/Service Water Cross Connect Valve
11EFG03CA	3101	EFHV0041	P	5.1.2	ESW A To Service Water Isolation Valve
11EFG03CB	3101	EFHV0041	C	5.1.2	ESW A To Service Water Isolation Valve
11EFG03DA	3101	EFHV0042	P	5.1.2	ESW B To Service Water Isolation Valve
11EFG03DB	3101	EFHV0042	C	5.1.2	ESW B To Service Water Isolation Valve
11EFG06AA	3101	EFHV0037	P	5.1.2	ESW A To Ultimate Heat Sink Isolation Valve
11EFG06AB	3101	EFHV0037	C	5.1.2	ESW A To Ultimate Heat Sink Isolation Valve
11EFI11EA	3101	EFFT0053	I	5.1.1	ESW Train A Flow Transmitter
14BGG11DA	3104	BGHV8111	P	5.2.1	CCP B Mini-Flow Valve
14BGG11DB	3104	BGHV8111	C	5.2.1	CCP B Mini-Flow Valve
14BGG12BD	3104	BGLCV112C	C	5.2.2	BNLCV112E Interlock
14BGG52BA	3104	BGHV8357B	P	5.2.3	CCP B Discharge to RCP Seals
14BGG52BB	3104	BGHV8357B	C	5.2.3	CCP B Discharge to RCP Seals
14BNG01BA	3104	BNLCV112E	P	5.2.2	RWST to CCP B Suction Valve
14BNG01BB	3104	BNLCV112E	C	5.2.2	RWST to CCP B Suction Valve
14BNG03BA	3104	BNHV8812B	P	5.2.4	RWST to RHR B Suction Valve
14BNG03BB	3104	BNHV8812B	C	5.2.4	RWST to RHR B Suction Valve
14EFB01SB	3104	DPEF01B	C	5.2.5	Train B ESW Pump Motor
14EFG02CA	3101, 3104	EFHV0025	P	5.1.2	ESW A/Service Water Cross Connect Valve
14EFG02CB	3101, 3104	EFHV0025	C	5.1.2	ESW A/Service Water Cross Connect Valve

Table C-1-4
PFSSD Cables Located in Fire Area C-1

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EFG02DA	3101, 3104	EFHV0026	P	5.1.2	ESW B/Service Water Cross Connect Valve
14EFG02DB	3101, 3104	EFHV0026	C	5.1.2	ESW B/Service Water Cross Connect Valve
14EFG02SD	3104	DFEF01B	C	5.2.5	ESW Pump B Traveling Water Screen
14EFG03AA	3101, 3104	EFHV0039	P	5.1.2	ESW A To Service Water Isolation Valve
14EFG03AB	3101, 3104	EFHV0039	C	5.1.2	ESW A To Service Water Isolation Valve
14EFG03BA	3101, 3104	EFHV0040	P	5.1.2	ESW B To Service Water Isolation Valve
14EFG03BB	3101, 3104	EFHV0040	C	5.1.2	ESW B To Service Water Isolation Valve
14EFG03SD	3104	EFHV0092	C	5.2.5	ESW B Screen Wash Water Valve
14EFG06BA	3101, 3104	EFHV0038	P	5.1.2	ESW B To Ultimate Heat Sink Isolation Valve
14EFG06BB	3101, 3104	EFHV0038	C	5.1.2	ESW B To Ultimate Heat Sink Isolation Valve
14EFG06SD	3104	EFHV0098	C	5.2.5	ESW B Pump Discharge Air Release
14EFG11SA	3104	CGD01B	C	5.1.3	Train B ESW Pump Room Supply Fan
14EFG11TA	3104	CGD01B	C	5.1.3	Train B ESW Pump Room Supply Fan
14EFI08RB	3104	EFPT0002	I	5.2.5	ESW Pump B Discharge Pressure
14EFI11FA	3101, 3104	EFFT0054	I	5.1.1	ESW Train B Flow Transmitter
14EFK01SA	3104	DPEF01B	C	5.2.5	ESW Pump B
14EJG04BA	3104	EJHV8804B	P	5.2.6	RHR Pump B to SI Pump B Isolation Valve
14EJG04BB	3104	EJHV8804B	C	5.2.6	RHR Pump B to SI Pump B Isolation Valve
14EJG08BB	3104	EJFCV0611	C	5.2.7	RHR B Mini Flow Valve
14EJG08BE	3104	EJFCV0611	P	5.2.7	RHR B Mini Flow Valve
14EJG08BF	3104	EJFIS0611	C	5.2.7	RHR B Mini Flow Indicating Switch
14GDG01BE	3104	CGD01B	C	5.1.3	Train B ESW Pump Room Supply Fan
14GDG01BH	3104	CGD01B	C	5.1.3	Train B ESW Pump Room Supply Fan

Table C-1-4
PFSSD Cables Located in Fire Area C-1

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GDI04BA	3104	GDTE0011	I	5.1.3	Train B ESW Pump Room Temperature Element
14GDI04BB	3104	GDTZ0011A	I	5.1.3	Train B ESW Pump Room Inlet Damper
14GDI04BC	3104	GDTZ0011B	I	5.1.3	Train B ESW Pump Room Recirc Damper
14GDY01BA	3104	CGD01B	C	5.1.3	Train B ESW Pump Room Supply Fan
14GLG05BA	3104	DSGL10B	P	5.2.8	RHR B Pump Room Cooler
14GLG05HA	3104	DSGL12B	P	5.2.8	CCP B Pump Room Cooler
14NGB10SB	3104	NB0216	C	5.2.9	Breaker NB0216 to XNG06
14NGY13BA	3104	NG100B	P	5.2.10	CVCS Heat Tracing Isolation Fuses

5.2.1 CCP Mini-Flow Valves

Valve BGHV8111 is a mini-flow valve on the CCP B discharge. This valve is required to be open during low flow operation of the B Train CCP to provide recirculation flow and prevent damage to the pump. Cables 14BGG11DA and 14BGG11DB are power and control cables, respectively, associated with valve BGHV8111 and are run in the south end of area C-1 in room 3104. Damage to these cables may prevent opening valve BGHV8111 or may cause the valve to spuriously close.

Valve BGHV8110 is the mini-flow valve associated with Train A CCP and is unaffected by a fire in area C-1. A fire in the south end of area C-1, including room 3104, may affect a number of components associated with Train B. Redundant Train A components are either located outside this fire area or are separated by more than 20 feet of horizontal separation with no intervening combustibles and suppression and detection installed in the area.

Based on the above discussion, redundant capability exists to ensure either Train A or Train B CCP mini-flow valves are available if a fire occurs in area C-1.

References: E-15000, XX-E-013, E-13BG11B, E-1F9102, E-1F9302, E-1R3212, M-12BG03

5.2.2 VCT and RWST Outlet to Charging Pump Suction Valves

Valves BGLCV0112B and BGLCV0112C are normally open series valves on the outlet of the VCT. The PFSSD methodology requires either valve BGLCV0112B or BGLCV0112C be closed and that suction to the CCPs be taken from the RWST by opening either valve BNLCV0112D (Train A) or BNLCV0112E (Train B).

Cable 14BGG12BD is the close permissive interlock circuit that isolates the Volume Control Tank (VCT) to Charging Pump suction valve (BGLCV0112C) when the RWST to CCP B valve (BNLCV0112E) is fully open. An intra-cable short in this cable due to a fire will provide a false close permissive signal, possibly causing the valve to close prior to establishing suction from the RWST. However, if a SIS or low-low VCT level signal is not present, then the valve will not close. A spurious SIS or low-low VCT level is not credible for a fire in area C-1.

Based on a review of drawing E-13BG12A a short to ground involving cable 14BGG12BD could blow the control power fuse and prevent closing valve BGLCV0112C. However, ZS/10, K602 and K647 contacts are normally open and will prevent a short to ground from blowing the fuse. The K602 contact closes on a SIS. A fire in area C-1 will not cause a spurious SIS. Therefore, the K602 contact will remain open during the event. The K647 contact closes on VCT low-low level. A fire in C-1 will not cause a spurious low-low VCT level. However, if makeup to the VCT is affected (assumed to occur because the components are not analyzed) and swapover to the RWST is not completed in a timely manner, an actual low-low level in the VCT could occur. Contact ZS/16 is closed with the valve in the open position. Therefore, a short to ground could blow the control power fuse.

A short to ground on conductor 11 in cable 14BGG12BD would have no impact as long as the close switch for valve BGLCV0112C stays in the normal position. However, as soon as operators place the switch in the close position, the fuse would blow, causing the valve to stall in the open position.

Cables 14BNG01BA and 14BNG01BB are power and control cables, respectively, associated with RWST to CCP B suction valve BNLCV0112E and are run in room 3104. Damage to these cables could prevent manual opening of valve BNLCV0112E from the control room or prevent automatic opening upon receipt of a SIS or low-low VCT level signal.

If a fire occurs on the south end of area C-1, including room 3104, Train A CCP is available, taking suction from the RWST via valve BNLCV0112D. When a low-low level signal in the VCT is received, valve BGLCV0112B will automatically close when BNLCV0112D is fully open, as designed, to isolate the VCT. Alternatively, operators can manually close valve BGLCV0112B from the control room using BGHIS0112B.

If a fire occurs on the north end of area C-1, cables 14BGG12BD, 14BNG01BA and 14BNG01BB are unaffected due to physical separation along with suppression and detection installed in the area.

Based on the above discussion, redundant capability exists to ensure the VCT is isolated and a suction source to the CCPs is available if a fire occurs in area C-1.

References: E-15000, XX-E-013, E-13BG12, E-13BG12A, E-13BN01, E-1F9102, E-1F9302, E-1R3212, M-12BG03, M-12BN01

5.2.3 CCP Discharge to RCP Seals Isolation Valves

Valve BGHV8357B is a normally closed valve on the discharge side of Train B CCP to RCP seals. The valve is required to be open when using Train B CCP to charge through the RCP seals. Hand indicating switch BGHIS8357B is used to open this valve from the control room.

Cables 14BGG52BA and 14BGG52BB are power and control cables, respectively, associated with BGHV8357B. These cables are run in the south end of area C-1 in room 3104. Damage to these cables may prevent opening valve BGHV8357B from the control room.

Cables associated with Train A CCP to RCP seals isolation valve BGHV8357A are not run in area C-1 and are unaffected by a fire in this area. Therefore, a fire in the south end of area C-1 will use Train A CCP and valve BGHV8357A to provide charging flow through the RCP seals. If the fire occurs in the north end, Train B CCP is available due to physical separation along with suppression and detection installed in the area.

Based on the above discussion, redundant capability exists to ensure one CCP train is available to charge through the RCP seals if a fire occurs in area C-1.

References: E-15000, XX-E-013, E-13BG52, E-1F9102, E-1F9302, E-1R3212, M-12BG03

5.2.4 RWST to RHR Pump B Suction Valve

Valve BNHV8812B is the isolation valve from RWST to Train B RHR pump. This valve, or valve EJHV8811B, is required to be closed to prevent draindown of the RWST into the containment sump. Cables associated with EJHV8811B are not run in area C-1.

Damage to cables 14BNG03BA or 14BNG03BB could prevent automatic or manual closing of valve BNHV8812B. However, since valve EJHV8811B is unaffected by a fire in area C-1, RWST draindown to the containment sump is averted.

Based on the above discussion, a fire in area C-1 will not cause the draindown of the RWST into the containment sump.

References: E-15000, XX-E-013, E-13BN03A, E-1F9102, E-1F9205, E-1R3212, M-12BN01, M-12EJ01

5.2.5 ESW Pumps

The traveling water screen on the operating ESW train is required to be operable. The traveling water screen motor starts either manually using a local hand switch in the ESW pump house or automatically when the ESW pump starts, provided the associated screen wash valve is open.

Cable 14EFG02SD is a control cable associated with ESW B pump running contact. This cable is run in the South end of area C-1 in room 3104. A short on this cable could provide a false permissive signal and start the traveling water screen motor DFEF01B, which has no adverse impact on PFSSD. An open in this cable will prevent an automatic start of DFEF01B. However, the traveling water screen can be manually started using local hand switch EFHIS0004.

Cable 14EFG03SD is a control cable associated with Train B ESW screen wash valve EFHV0092. This cable is run in the South end of area C-1 in room 3104. Damage to this cable could prevent the valve from automatically opening when the ESW pump starts or cause the valve to spuriously close when the pump is running. In either case, hand switch EFHS0092 is available to override the spurious signal.

Cable 14EFG06SD is a control cable associated with ESW B air release valve EFHV0098. This cable is run in the South end of area C-1 in room 3104. This valve relieves air from the ESW pump discharge line for a period of 15 seconds after the pump starts, at which time the valve automatically closes. Damage to this cable could prevent the valve from closing after a 15 second delay or could cause the valve to spuriously close prior to the 15 second delay.

Cable 14EFI08RB is an instrument cable associated with ESW B discharge pressure transmitter EFPT0002. This cable is run in the South end of area C-1 in room 3104. Damage to this cable could cause a loss of pressure indication in the control room.

Cable 14EFK01SA is a control cable associated with ESW pump PEF01B local hand indicating switch EFHIS0056B. This cable is run in the South end of area C-1 in room 3104. Damage to this cable could prevent operating the B Train ESW pump due to a short across conductors P1 and 21 which will energize AR-C and provide a false stop signal.

Cable 14EFB01SB is a control cable associated with Train B ESW pump motor DPEF01B. This cable is run in the South end of area C-1 in room 3104. Damage to this cable could prevent operation of the B Train ESW pump.

If a fire occurs in the South end of area C-1, Train B ESW may be unavailable due to damage to the cables discussed above. However, Train A ESW is unaffected due to physical separation along with suppression and detection installed in the area. If a fire occurs in the North end, Train B ESW is available. Cables for Train A ESW traveling water screen, screen wash valve and air release valve are not run in area C-1.

Based on the above discussion, a fire in area C-1 will not prevent operation of one train of ESW.

References: E-15000, XX-E-013, E-K3EF01A, E-K3EF02, E-K3EF03, E-K3EF06, E-K3EF08, E-1F9402A, E-1F9402B, E-1R3212

5.2.6 RHR Pump B to Safety Injection Pump Isolation Valve

Valve EJHV8804B is the RHR pump B to Safety Injection pump isolation valve. The PFSSD position of this valve is closed during RHR Train B operation. A fire in area C-1 South uses RHR Train A.

Cable 14EJG04BA is the power cable for valve EJHV8804B. Cable 14EJG04BB is a control cable for valve EJHV8804B. These cables run in the South end of area C-1 in room 3104. Valve EJHV8804B is normally closed.

The only possible failure mode that would cause valve EJHV8804B to spuriously open would be a three-phase external (inter-cable) cable-to-cable hot short across the conductors in cable 14EJG04BA. However, the assumptions section in Calculation XX-E-013 states that the probability of a three-phase hot short in the proper sequence is extremely low and does not require evaluation, except in cases of high-low pressure interfaces. Valve EJHV8804B is not a high-low pressure interface.

There is reasonable assurance that a fire in area C-1 will not cause the spurious opening of valve EJHV8804B. In the unlikely event valve EJHV8804B spuriously opens, PFSSD is assured since RHR pump A is available for a fire in area C-1 South.

References: E-15000, XX-E-013, E-13EJ04B

5.2.7 RHR Pump Mini Flow Valves

Valve EJFCV0611 is installed on the recirculation line of the ‘B’ RHR pump and controls recirc flow to protect the pump during low flow conditions. The valve is required to be open during RHR pump B operation (cold shutdown). The valve is not required during hot standby.

Cable 14EJG08BB is the control cable for RHR pump B mini-flow valve EJFCV0611. Cable 14EJG08BE is the power cable for valve EJFCV0611. Cable 14EJG08BF is the control cable for RHR pump B mini-flow switch EJFIS0611. These cables run in the South end of area C-1 in room 3104. Damage to these cables could prevent the mini-flow valve from operating as designed. Therefore, RHR pump B may not be available if a fire occurs on the South end of area C-1.

Cables associated with Train A RHR mini-flow valve EJFCV0610 are unaffected by a fire in area C-1. If a fire occurs in South end of area C-1, Train A RHR is available for cold shutdown. If the fire is on the North end, Train B RHR is unaffected due to physical separation along with suppression and detection installed in the area.

References: E-15000, XX-E-013, E-13EJ08, E-13EJ08A

5.2.8 Centrifugal Charging Pump (CCP) and Residual Heat Removal (RHR) Pump Room Coolers

Cable 14GLG05BA is the power cable to the ‘B’ RHR pump room cooler (DSGL10B). Cable 14GLG05HA is the power cable to the ‘B’ CCP pump room cooler (DSGL12B). These cables run in the South end of area C-1 in room 3104.

Damage to either of these cables will prevent operation of the associated Train B room cooler. Cables associated with Train A RHR and CCP room coolers are unaffected by a fire in area C-1. If a fire occurs in the South end of area C-1, Train A RHR and CCP room coolers are available to ensure PFSSD. If a fire occurs in the North end, Train B RHR and CCP room coolers are unaffected due to physical separation along with suppression and detection installed in the area.

Based on the above discussion, a fire in area C-1 will not prevent operation of one train of RHR and CCP room coolers.

References: E-15000, XX-E-013, E-13GL05

5.2.9 4160 V Distribution to ESW Pump House

Cable 14NGB10SB is a control cable associated with the 4160V transformer feeder breaker 152NB0216 overcurrent protective circuit. Feeder breaker NB0216 feeds ESW Train B pump house 480V loads. Damage to this cable due to a fire could cause a loss of feeder breaker 152NB0216 control and loss of power to Train B ESW pumphouse loads.

Cables associated with Train A ESW pumphouse feeder breaker NB0116 do not run in area C-1. If a fire occurs in the South end of area C-1, Train A ESW equipment is available to ensure PFSSD. If a fire occurs in the North end, Train B ESW equipment is available to ensure PFSSD due to physical separation along with suppression and detection installed in the area.

Based on the above discussion, a fire in area C-1 will not prevent operation of at least one train of ESW.

References: E-15000, XX-E-013, E-K3NG10A

5.2.10 CVCS Heat Tracing

Heat tracing has been installed to maintain the emergency borate line and other fluid lines above the solidification temperature in the Train A SI pump room. Both safety trains can power the heat tracing; an automatic transfer switch (QJS0001) switches from Train A (primary source) to Train B (alternate source) on loss of A Train.

Fire area C-1 contains a cable (14NGY13BA) associated with the CVCS heat tracing system. This cable provides a secondary source of power to the heat tracing system. The primary source of power from cable 11NGY13AA (Not a PFSSD cable) is unaffected.

Per Calculation XX-E-013, the emergency borate line and heat tracing is credited for long term boration after a control room fire. The heat tracing system is not credited for PFSSD where the fire is outside the control room. Although a fire in area C-1 could affect the secondary source of power to the heat tracing system, the system is not required for a fire in area C-1. Loss of this cable will not adversely impact PFSSD. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-13NG13, E-13QJ07, DCP 13130

FIRE AREA C-2

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1.0 GENERAL AREA DESCRIPTION

Fire area C-2 is located on the 1974 elevation of the Control Building and includes the room listed in Table C-2-1.

Table C-2-1
Rooms Located in Fire Area C-2

ROOM #	DESCRIPTION
3106	North small electrical chase.

Fire area C-2 is protected with an automatic wet-pipe sprinkler system and automatic smoke detection. The area is separated on all sides by minimum 3-hour fire resistance rated barriers.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Fire area C-2 contains no post-fire safe shutdown cables or equipment. Therefore, both trains of PFSSD equipment are available if a fire occurs in this area.

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

Not applicable to fire area C-2.

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

A detailed analysis is not required since this area contains no PFSSD cables or components.

FIRE AREA C-3

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-3 is located on the 1974 elevation of the Control Building and includes the room listed in Table C-3-1.

Table C-3-1
Rooms Located in Fire Area C-3

ROOM #	DESCRIPTION
3105	South electrical chase.

Fire area C-3 is protected with an automatic wet-pipe sprinkler system and automatic smoke detection. The area is separated on all sides by minimum 3-hour fire resistance rated barriers.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Fire area C-3 contains no post-fire safe shutdown cables or equipment. Therefore, both trains of PFSSD equipment are available if a fire occurs in this area.

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

Not applicable to fire area C-3.

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

A detailed analysis is not required since this area contains no PFSSD cables or components.

FIRE AREA C-5

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1.0 GENERAL AREA DESCRIPTION

Fire area C-5 is located on the 1984 elevation of the Control Building and includes the rooms listed in Table C-5-1.

Table C-5-1
Rooms Located in Fire Area C-5

ROOM #	DESCRIPTION
3206	RCA Egress (Corridor)
3212	HP Lounge
3212A	Partial Height Electrical Chase
3213	HP Conference Room (West)
3214	Hall
3216	RP Calibration LAB #2
3217	Men's Toilet
3218	Exit Monitor Area
3220	Sign In/Out Area
3221	Vestibule No. 1
3222	H.P. Office
3223	Closet
3224	Vestibule No. 2
3231	Women's Toilet
NAC	Area Above Suspended Ceiling

Fire area C-5 is protected with an automatic wet-pipe sprinkler system above and below the suspended ceiling. In addition, partial automatic fire detection is installed. The fire area is separated from adjacent fire areas by minimum 3-hour fire resistant construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-5-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-5-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-5

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
AL	Aux. Feedwater System	H, P	Train A motor driven auxiliary feedwater pump may not be available. Train B motor driven auxiliary feedwater pump and the turbine driven auxiliary feedwater pump are unaffected by a fire in area C-5.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
BG	Chemical and Volume Control System	R, M, S	Train A centrifugal charging pump may not be available. Train B centrifugal charging pump is unaffected.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
EF	Essential Service Water System	H, S	Several Train A ESW components could be affected. Train B ESW is unaffected.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
EJ	Residual Heat Removal System	M, H, P	Train A residual heat removal pump may not be available. Train B residual heat removal pump is unaffected.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.

Table C-5-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-5

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
GD	ESW Pump House HVAC	S	Train A ESW pump room ventilation may be affected. Train B ESW pump room ventilation is unaffected.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
KJ	Standby Diesel Engine	S	Since Train A ESW could be lost, the Train A diesel engine may not be available. The Train B diesel engine is available.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.

Table C-5-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-5

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	Off-site power to buses NB01 and NB02 could be affected. The Train B emergency diesel generator is available to energize NB02. The train A emergency diesel generator may not be available due to potential loss of Train A ESW.
NE	Standby Diesel Generator	S	Since Train A ESW could be lost, the Train A diesel generator may not be available. The Train B diesel generator is available.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
NG	480V Load Centers and MCCs	S	Train A 480 VAC load centers NG01 and NG03 and motor control center (MCC) NG05E could lose power. Redundant PFSSD components are available using Train B load centers NG02 and NG04 and MCC NG06E.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.

Table C-5-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-5

System	System Name	PFSSD Function*	Comments
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-5.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in fire area C-5. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post Fire Safe Shutdown is assured if a fire occurs in fire area C-5.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-5.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-5

PFSSD components (S. in E-15000) located in fire area C-5 are shown in Table C-5-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table C-5-3.

5.2 PFSSD CABLE EVALUATION

Table C-5-4 lists all the PFSSD cables (S. in E-15000) located in fire area C-5. The applicable evaluation section is also listed in Table C-5-4.

Table C-5-3 PFSSD Equipment Located in Fire Area C-5				
Room #	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
3212	TB32114	Terminal Box	5.2.3	
3224	TB32105	Terminal Box	5.2.3	

Table C-5-4
PFSSD Cables Located in Fire Area C-5

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ALB01AA	NAC	DPAL01A	P	5.2.1	Auxiliary Feedwater Pump A Motor
11BGB01AA	NAC	DPBG05A	P	5.2.2	Centrifugal Charging Pump A Motor
11EFB01SB	3224, NAC	DPEF01A	C	5.2.3	ESW Pump A Motor
11EFB01SE	NAC	DPEF01A	P	5.2.3	ESW Pump A Motor
11EFB01SF	NAC	DPEF01A	P	5.2.3	ESW Pump A Motor
11EFG02AA	3222, 3224, NAC	EFHV0023	P	5.2.3	ESW A/Service Water Cross Connect Valve
11EFG02AB	3222, 3224, NAC	EFHV0023	C	5.2.3	ESW A/Service Water Cross Connect Valve
11EFG02BA	3222, 3224, NAC	EFHV0024	P	5.2.3	ESW B/Service Water Cross Connect Valve
11EFG02BB	3222, 3224, NAC	EFHV0024	C	5.2.3	ESW B/Service Water Cross Connect Valve
11EFG02SD	3224, NAC	DFEF01A	C	5.2.3	Train A ESW Traveling Water Screen
11EFG03CA	3222, 3224, NAC	EFHV0041	P	5.2.3	ESW A to Service Water Isolation Valve
11EFG03CB	3222, 3224, NAC	EFHV0041	C	5.2.3	ESW A to Service Water Isolation Valve
11EFG03DA	3222, 3224, NAC	EFHV0042	P	5.2.3	ESW B to Service Water Isolation Valve
11EFG03DB	3222, 3224, NAC	EFHV0042	C	5.2.3	ESW B to Service Water Isolation Valve
11EFG03SD	3224, NAC	EFHV0091	C	5.2.3	ESW A Screen Wash Water Valve
11EFG06AA	3222, 3224, NAC	EFHV0037	P	5.2.3	ESW A to UHS Isolation Valve
11EFG06AB	3222, 3224, NAC	EFHV0037	C	5.2.3	ESW A to UHS Isolation Valve
11EFG06SD	3224, NAC	EFHV0097	C	5.2.3	ESW Pump A Air Release Valve
11EFG11SA	3224, NAC	DPEF01A	C	5.2.3	Train A ESW Pump Control HIS and Interposing Relays
11EFG11TA	3224, NAC	DPEF01A	C	5.2.3	Train A ESW Pump Control HIS and Interposing Relays
11EFI08RB	3224, NAC	EFPT0001	I	5.2.3	ESW Pump A Discharge Pressure

Table C-5-4
PFSSD Cables Located in Fire Area C-5

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EFI11EA	3222, 3224, NAC	EFFT0053	I	5.2.3	ESW Train A Flow Transmitter
11EFK01SB	3224, NAC	DPEF01A	C	5.2.3	Train A ESW Pump Control HIS and Interposing Relays
11EJB01AA	NAC	DPEJ01A	P	5.2.5	Train A RHR Pump Motor
11GDG01AC	3212, 3224, NAC	DCGD01A	C	5.2.3	Train A ESW Pump Room Supply Fan Motor
11GDG01AD	3212, NAC	DCGD01A	C	5.2.3	Train A ESW Pump Room Supply Fan Motor
11GDI04AA	3224, NAC	GDTE0001	I	5.2.3	Train A ESW Pump Room Temperature
11GDI04AB	3224, NAC	GDTZ0001A	I	5.2.3	Train A ESW Pump Room Inlet Damper
11GDI04AC	3224, NAC	GDTZ0001B	I	5.2.3	Train A ESW Pump Room Recirc Damper
11GDY01AA	3212, 3224, NAC	DCGD01A	C	5.2.3	Train A ESW Pump Room Supply Fan HIS and Interposing Relays
11GDY01AD	3212, NAC	DCGD01A	C	5.2.3	Train A ESW Pump Room Supply Fan HIS and Interposing Relays
11NGB10SB	3224, NAC	NB00116	P	5.2.3	NG05E Feeder Breaker
11NGG01AA	NAC	XNG01	P	5.2.6	XNG01 Incoming Power Feed from NB0113
11NGG01AB	NAC	NG01A	P	5.2.6	NG01A Incoming Power Feed from NG0106
11NGG01AC	NAC	NG01A	P	5.2.6	NG01A Incoming Power Feed from NG0106
11NGG01BA	NAC	XNG03	P	5.2.6	XNG03 Incoming Power Feed from NB0110
11NGG01SA	NAC	XNG05	P	5.2.3	XNG05 Incoming Power from NB0116
15NBB03AA	3216, 3217, 3218, 3220, 3222, 3231, NAC	NB01	P	5.2.4	Phase A Power Feed XNB01 to NB01
15NBB03AC	3216, 3217, 3218, 3220, 3222, 3231, NAC	NB01	P	5.2.4	Phase B Power Feed XNB01 to NB01

Table C-5-4
PFSSD Cables Located in Fire Area C-5

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15NBB03AE	3216, 3217, 3218, 3220, 3222, 3231, NAC	NB01	P	5.2.4	Phase C Power Feed XNB01 to NB01
16NBB05AA	3216, 3218, 3222, NAC	NB02	P	5.2.4	Phase A Power Feed XNB02 to NB02
16NBB05AB	3216, 3218, 3222, NAC	NB02	P	5.2.4	Phase B Power Feed XNB02 to NB02
16NBB05AC	3216, 3218, 3222, NAC	NB02	P	5.2.4	Phase C Power Feed XNB02 to NB02

5.2.1 Auxiliary Feedwater

For decay heat removal, the PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

Power cable 11ALB01AA, associated with Train A MDAFP motor DPAL01A, is run in fire area C-5. Damage to this cable could prevent operation of the pump. Redundant Train B MDAFP cables are run in a separate fire area and are unaffected by a fire in area C-5. In addition, the TDAFP is unaffected by a fire in area C-5.

Based on the above discussion, auxiliary feedwater is assured using the Train B MDAFP to supply steam generators A and D or the TDAFP to supply steam generators A, B, C and D.

References: XX-E-013, E-15000, E-13NB01, E-1F9202, E-1F9204, M-12AL01

5.2.2 Centrifugal Charging

At least one centrifugal charging pump (CCP) is required for PFSSD to supply a source of borated water to the RCS and to provide makeup due to inventory loss in the RCS. For PFSSD, the safety related CCPs are credited. The normal charging pump may continue to operate, but it is not credited for PFSSD so it is assumed lost.

A power cable (11BGB01AA) associated with the Train A CCP runs through fire area C-5. Damage to this cable could prevent operation of the pump. Redundant Train B CCP cables are run in a separate fire area and are unaffected by a fire in area C-5. Therefore, PFSSD is assured using Train B CCP if a fire occurs in area C-5.

References: XX-E-013, E-15000, E-13NB01, E-1F9102, E-1F9302, M-12BG03

5.2.3 Essential Service Water System

One train of Essential Service Water (ESW) is required to be operable to ensure adequate cooling for credited PFSSD equipment. The available ESW train needs to be capable of supplying its respective PFSSD loads during the event.

Terminal box TB32114 includes PFSSD cables 11GDG01AC, 11GDG01AD, 11GDY01AA and 11GDY01AD, which are the only PFSSD cables in TB32114. Cables 11GDG01AC and 11GDG01AD are associated with the indicator lights on Train A ESW pump room supply fan CGD01A hand switch GDHIS0001B. Cables 11GDY01AA and 11GDY01AD are associated with Train A ESW pump room supply fan CGD01A control circuit and allow control of the fan from the control room using hand switch GDHIS0001A. Damage to these cables could prevent operation or cause maloperation of the supply fan. If this occurs, the Train A ESW pump room may not have sufficient ventilation when the Train A ESW pump is operating.

Terminal box TB32105 includes PFSSD cables 11EFG11SA, 11EFG11TA and 11EFK01SB. Cables 11EFG11SA and 11EFG11TA were originally spare cables but the conductors are now used for various functions at the ESW pumphouse. Cable 11EFK01SB is a control cable for Train B ESW pump local hand switch EFHIS0055B. The function supported by these cables is to provide local control of the Train A ESW pump. Damage to the cables could prevent operation of the Train A ESW pump.

Cables 11EFB01SE and 11EFB01SF are power cables for the Train A ESW pump motor DPEF01A. Cable 11EFB01SB is a control cable associated with Train A ESW pump breaker NB00115. Damage to these cables will prevent operation of the Train A ESW pump.

Cable 11EFG02SD is a control cable that provides an automatic start signal to the Train A ESW traveling water screen when the Train A ESW pump runs. Damage to the cable could prevent automatic operation of the screen. Circuits for Train B traveling water screen do not run through area C-5.

Cable 11EFG03SD is a control cable associated with ESW Train A screen wash water valve EFHV0091. Damage to this cable could prevent automatic operation of the valve. Circuits for Train B screen wash water valve EFHV0092 do not run through area C-5.

Cable 11EFG06SD is associated with Train A ESW pump air release valve EFHV0097. The air release valve purges air from the pump casing upon pump start to ensure pump operability. Damage to the cable could prevent automatic operation of the air release valve. Circuits for Train B ESW pump air release valve EFHV0098 do not run through area C-5.

Pressure transmitter EFPT0001 and flow transmitter EFFT0053 are included in the PFSSD design to provide diagnostic instrumentation of ESW system operation. Cables 11EFI08RB and 11EFI11EA associated with these transmitters are run in fire area C-5. Damage to the cables could prevent proper diagnostic instrumentation of Train A ESW operation. Pressure and flow transmitters associated with the Train B ESW system are unaffected by a fire in area C-5.

Cable 11GDI04AA provides ESW A room temperature from temperature element GDTE0001 to temperature controller GDTC0001. Cables 11GDI04AB and 11GDI04AC provide signals from GDTC0001 to outside air intake damper GDTZ0001A and recirculation damper GDTZ0001B, respectively, to change position based on room temperature. Damage to these cables could prevent operation of the dampers. Temperature controls for Train B ESW pump room are unaffected by a fire in area C-5.

Power and control cables associated with a number of valves in the Train A ESW system are run in fire area C-5. Damage to the cables due to a fire could cause the spurious operation or prevent operation of the valves from the control room. If this occurs, redundant valves are available to ensure operability of the Train B ESW system.

Cable 11NGB10SB is associated with Train A ESW pump room load center NG05E feeder breaker NB0116. Cable 11NGG01SA is a power cable from NB0116 to XNG05. Damage to 11NGB10SB could cause the breaker to spuriously trip or spuriously close. Damage to 11NGG01SA could prevent operation of the breaker. Train B ESW pump room load center NG06E is unaffected by a fire in area C-5.

Based on the above discussion, Train A ESW may not be available if a fire occurs in fire area C-5. PFSSD is assured for a fire in area C-5 using Train B ESW pump PEF01B and associated components.

References: E-15000, XX-E-013, E-13EF02, E-13EF03, E-13EF06, E-13EF11, E-K3EF01, E-K3EF02, E-K3EF03, E-K3EF06, E-K3EF08, E-K3EF11, E-K3GD01, E-K3GD04, E-K3NG01, E-K3NG10, E-1F9402A, E-1F9402B, E-1F9403, E-1F9443, M-12EF01, M-12EF02, M-K2EF01, M-K2GD01

5.2.4 Class 1E 4.16 kV ESF Switchgear Buses NB01 and NB02

One Class 1E 4.16 kV bus is required to power PFSSD equipment in the event of a fire. Bus NB01 normally powers Train A safety related equipment while Bus NB02 normally powers Train B safety related equipment. The normal source of power is from off-site sources while the safety-related source of power is from the emergency diesel generators. Each bus can be cross-trained to the opposite transformer.

Cables 15NBB03AA, 15NBB03AC and 15NBB03AE are power cables that provide the normal off-site source of power from transformer XNB01 to bus NB01. Cables 16NBB05AA,

16NBB05AB and 16NBB05AC are power cables that provide the normal off-site source of power from transformer XNB02 to bus NB02. Damage to these cables will cause a loss of off-site power on NB01 and NB02. As discussed in Section 5.2.3, Train A ESW may not be available. Therefore, the Train A emergency diesel generator may not be available. The train B emergency diesel generator remains available.

Based on the above discussion, off-site power to NB01 and NB02 could be lost if a fire occurs in this area and the Train A emergency diesel generator may not be available. The Train B emergency diesel generator remains available to energize NB02.

References: E-15000, XX-E-013, E-13NB03, E-13NB05, E-13NB06, E-1F9423

5.2.5 Residual Heat Removal System

The residual heat removal (RHR) system is required to remove decay heat from the RCS during transition from hot shutdown to cold shutdown. At least one RHR train is required to be operable for PFSSD.

A power cable (11EJB01AA) associated with Train A RHR pump motor DPEJ01A is run in fire area C-5. Damage to this cable will prevent operation of the Train A RHR pump. Redundant Train B RHR cables are run in a separate fire area and are unaffected by a fire in area C-5. Therefore, PFSSD is assured using Train B RHR if a fire occurs in area C-5.

References: XX-E-013, E-15000, E-13NB01, E-1F9205

5.2.6 Train A 480 Volt Class 1E Power

One train of class 1E 480 Volt power is required to be operable to energize the credited PFSSD components.

A fire in area C-5 could disrupt power to Train A 480 Volt Class 1E Load Centers NG01 and NG03. Cable 11NGG01AA supplies power from NB0113 to transformer XNG01. Loss of power to XNG01 will interrupt power to load center NG01. Cables 11NGG01AB and 11NGG01AC are power cables that supply power to motor control center (MCC) NG01A. Cable 11NGG01BA supplies power from NB0110 to transformer XNG03. Therefore, all power to NG01 and NG03 could be lost in the event of a fire in area C-5.

Logic diagrams E-1F9424A and E-1F9424C identify all PFSSD components affected by a loss of power to NG01 and NG03. If this occurs, power to redundant Train B components is available using load centers NG02 and NG04, which are unaffected by a fire in area C-5. Therefore, loss of power to Train A components supplied by NG01 and NG03 will not impact the ability to achieve and maintain safe shutdown following a fire in this area.

References: XX-E-013, E-15000, E-13NG01A, E-1F9424A, E-1F9424B, E-1F9424C, E-1F9424D

FIRE AREA C-6

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-6 is located on the 1984 elevation of the Control Building and includes the rooms listed in Table C-6-1.

Table C-6-1
Rooms Located in Fire Area C-6

ROOM #	DESCRIPTION
3201	Stairway C-1
3202	Controlled H.P. Tool & Instrument Storage Room
3203	Hot Janitors Closet
3204	Corridor No. 1
3205	H.P. Area
3205A	Partial Height Electrical Chase
3207	RCA Ingress
3208	RP Calibration Lab #1
3209	Decon Area
3210	Decon Shower
3211	HP Conference Room (East)
SAC	Area Above Suspended Ceiling

Fire area C-6 is protected with an automatic wet-pipe sprinkler system above and below the suspended ceiling. In addition, partial automatic fire detection is installed. The fire area is separated from adjacent fire areas by minimum 3-hour fire resistant construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-6-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-6-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-6

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
AL	Aux. Feedwater System	H, P	Train B motor driven auxiliary feedwater pump may not be available. Train A motor driven auxiliary feedwater pump and the turbine driven auxiliary feedwater pump are unaffected by a fire in area C-6.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
BG	Chemical and Volume Control System	R, M, S	Train B centrifugal charging pump may not be available. Train A centrifugal charging pump is unaffected.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
EF	Essential Service Water System	H, S	Several Train B ESW components could be affected. Train A ESW is unaffected.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
EJ	Residual Heat Removal System	M, H, P	Train B residual heat removal pump may not be available. Train A residual heat removal pump is unaffected.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.

Table C-6-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-6

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
GD	ESW Pump House HVAC	S	Train B ESW pump room ventilation may be affected. Train A ESW pump room ventilation is unaffected.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
KJ	Standby Diesel Engine	S	Since Train B ESW could be lost, the Train B diesel engine may not be available. The Train A diesel engine is available.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.

Table C-6-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-6

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	Off-site power to bus NB01 and NB02 could be affected. The Train A emergency diesel generator is available to energize NB01. The train B emergency diesel generator may not be available due to potential loss of Train B ESW.
NE	Standby Diesel Generator	S	Since Train B ESW could be lost, the Train B diesel generator may not be available. The Train A diesel generator is available.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
NG	480V Load Centers and MCCs	S	Train B 480 VAC load centers NG02 and NG04 and motor control center (MCC) NG06E could lose power. Redundant PFSSD components are available using Train A load centers NG01 and NG03 and MCC NG05E.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
PK	125VDC	S	Class 1E 480 VAC power to inverter PK22 could be disrupted. Battery rack PK12 is unaffected and is available to supply short-term 125 VDC power to bus PK02. Redundant inverter PK21 is available to provide long term power to bus PK01. Class 1E 480 VAC power to inverter PK24 could be disrupted. Battery rack PK14 is unaffected and is available to supply short-term 125 VDC power to bus PK04.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.

Table C-6-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-6

System	System Name	PFSSD Function*	Comments
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-6.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in fire area C-6. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post Fire Safe Shutdown is assured if a fire occurs in fire area C-6.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-6.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-6

There are no PFSSD components located in fire area C-6.

5.2 PFSSD CABLE EVALUATION

Table C-6-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-6. The applicable evaluation section is also listed in Table C-6-3.

Table C-6-3
PFSSD Cables Located in Fire Area C-6

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALB01BA	SAC	DPAL01B	P	5.2.1	Train B MDAFP Motor
14BGB01BA	SAC	DPBG05B	P	5.2.2	Train B Centrifugal Charging Pump Motor
14EFB01SB	SAC	DPEF01B	C	5.2.3	Train B ESW Pump Motor
14EFB01SE	SAC	DPEF01B	P	5.2.3	Train B ESW Pump Motor
14EFB01SF	SAC	DPEF01B	P	5.2.3	Train B ESW Pump Motor
14EFG02CA	3204, SAC	EFHV0025	P	5.2.3	Service Water to Train A ESW
14EFG02CB	3204, SAC	EFHV0025	C	5.2.3	Service Water to Train A ESW
14EFG02DA	3204, SAC	EFHV0026	P	5.2.3	Service Water to Train B ESW
14EFG02DB	3204, SAC	EFHV0026	C	5.2.3	Service Water to Train B ESW
14EFG02SD	SAC	DFEF01B	C	5.2.3	Train B ESW Traveling Water Screen Motor
14EFG03AA	3204, SAC	EFHV0039	P	5.2.3	ESW to Service Water Cross Connect Valve
14EFG03AB	3204, SAC	EFHV0039	C	5.2.3	ESW to Service Water Cross Connect Valve
14EFG03BA	3204, SAC	EFHV0040	P	5.2.3	ESW to Service Water Cross Connect Valve
14EFG03BB	3204, SAC	EFHV0040	C	5.2.3	ESW to Service Water Cross Connect Valve
14EFG03SD	SAC	EFHV0092	C	5.2.3	Train B ESW Screen Wash Valves
14EFG06BA	3204, SAC	EFHV0038	P	5.2.3	ESW to UHS Isolation Valve
14EFG06BB	3204, SAC	EFHV0038	C	5.2.3	ESW to UHS Isolation Valve
14EFG06SD	SAC	EFHV0098	C	5.2.3	Train B ESW Pump Air Release Valve
14EFG11SA	SAC	DCGD01B	C	5.2.3	Train B ESW Pump Room Supply Fan Motor
14EFG11TA	SAC	DCGD01B	C	5.2.3	Train B ESW Pump Room Supply Fan Motor
14EFI08RB	SAC	EFPT0002	I	5.2.3	ESW Pump B Discharge Pressure
14EFI11FA	3204, SAC	EFFT0054	I	5.2.3	ESW Train B Flow Transmitter

Table C-6-3
PFSSD Cables Located in Fire Area C-6

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EFK01SA	SAC	EFHIS0056B	C	5.2.3	Train B ESW Pump Control HIS
14EJB01BA	SAC	DPEJ01B	P	5.2.5	Train B RHR Pump Motor
14GDG01BE	SAC	DCGD01B	C	5.2.3	Train B ESW Pump Room Supply Fan Motor
14GDG01BH	SAC	DCGD01B	C	5.2.3	Train B ESW Pump Room Supply Fan Motor
14GDI04BA	SAC	GDTE0011	I	5.2.3	Train B ESW Pump Room Temperature Element
14GDI04BB	SAC	GDTZ0011A	I	5.2.3	Train B ESW Pump Room Inlet Damper
14GDI04BC	SAC	GDTZ0011B	I	5.2.3	Train B ESW Pump Room Recirc Damper
14GDY01BA	SAC	DCGD01B	C	5.2.3	Train B ESW Pump Room Supply Fan Motor
14NGB10SB	SAC	NB0216	P	5.2.3	Breaker NB0216 to XNG06
14NGG01AA	SAC	XNG02	P	5.2.6	Breaker NB0213 to XNG02
14NGG01AB	SAC	NG02A	P	5.2.6	Breaker NG0206 to NG02ABF5
14NGG01AC	SAC	NG02A	P	5.2.6	Breaker NG0206 to NG02ABF5
14NGG01BA	SAC	XNG04	P	5.2.6	Breaker NB0210 to XNG04
14NGG01SA	SAC	XNG06	P	5.2.3	Breaker NB0216 to XNG06
16NBB05AA	3208, SAC	NB02	P	5.2.4	Phase A Power Feed XNB02 to NB0209
16NBB05AB	3208, SAC	NB02	P	5.2.4	Phase B Power Feed XNB02 to NB0209
16NBB05AC	3208, SAC	NB02	P	5.2.4	Phase C Power Feed XNB02 to NB0209
16PKG11BA	SAC	PK22	P	5.2.7	480 VAC Power to Non-Class 1E Battery Charger PK22 from NG0409
16PKG13AA	3211	PK04	P	5.2.8	125 VDC Non-Class 1E Battery Charger

5.2.1 Auxiliary Feedwater

For decay heat removal, the PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

Power cable 14ALB01BA, associated with Train B MDAFP motor DPAL01B, is run in fire area C-6. Damage to this cable could prevent operation of the pump. Redundant Train A MDAFP cables are run in a separate fire area and are unaffected by a fire in area C-6. In addition, the TDAFP is unaffected by a fire in area C-6.

Based on the above discussion, auxiliary feedwater is assured using the Train A MDAFP to supply steam generators B and C or the TDAFP to supply steam generators A, B, C and D.

References: XX-E-013, E-15000, E-13NB04, E-1F9202, E-1F9204, M-12AL01

5.2.2 Centrifugal Charging

At least one centrifugal charging pump (CCP) is required for PFSSD to supply a source of borated water to the RCS and to provide makeup due to inventory loss in the RCS. For PFSSD, the safety related CCPs are credited. The normal charging pump may continue to operate, but it is not credited for PFSSD so it is assumed lost.

A power cable (14BGB01BA) associated with the Train B CCP runs through fire area C-6. Damage to this cable could prevent operation of the pump. Redundant Train A CCP cables are run in a separate fire area and are unaffected by a fire in area C-6. Therefore, PFSSD is assured using Train A CCP if a fire occurs in area C-6.

References: XX-E-013, E-15000, E-13NB04, E-1F9102, E-1F9302, M-12BG03

5.2.3 Essential Service Water System

One train of Essential Service Water (ESW) is required to be operable to ensure adequate cooling for credited PFSSD equipment. The available ESW train needs to be capable of supplying its respective PFSSD loads during the event.

Cables 14EFB01SE and 14EFB01SF are power cables for the Train B ESW pump motor DPEF01B. Cable 14EFB01SB is a control cable associated with Train B ESW pump motor DPEF01B. Cable 14EFK01SA is a control cable for Train B ESW pump local hand switch EFHIS0056B. Damage to these cables could prevent operation of the Train B ESW pump.

Cables 14EFG11SA and 14EFG11TA were originally spare cables but the conductors are now used for various functions at the ESW pumphouse. The PFSSD function supported by these two cables is to control the Train B ESW pump room supply fan. Damage to the cables could prevent operation of the Train B ESW pump room supply fan.

Cable 14EFG02SD is a control cable that provides an automatic start signal to the Train B ESW traveling water screen when the Train B ESW pump runs. Damage to the cable could prevent automatic operation of the screen. Circuits for Train A traveling water screen do not run through area C-6.

Cable 14EFG03SD is a control cable associated with ESW Train B screen wash water valve EFHV0092. Damage to this cable could prevent automatic operation of the valve. Circuits for Train A screen wash water valve EFHV0091 do not run through area C-6.

Cable 14EFG06SD is associated with Train A ESW pump air release valve EFHV0098. The air release valve purges air from the pump casing upon pump start to ensure pump operability.

Damage to the cable could prevent automatic operation of the air release valve. Circuits for Train A ESW pump air release valve EFHV0097 do not run through area C-6.

Pressure transmitter EFPT0002 and flow transmitter EFFT0054 are included in the PFSSD design to provide diagnostic instrumentation of ESW system operation. Cables 14EFI08RB and 14EFI11FA associated with these transmitters are run in fire area C-6. Damage to the cables could prevent proper diagnostic instrumentation of Train B ESW operation. Pressure and flow transmitters associated with the Train A ESW system are unaffected by a fire in area C-6.

Cables 14GDG01BE, 14GDG01BH and 14GDY01BA are associated with Train B ESW pump room supply fan CGD01B control circuit and allow control of the fan from the control room using hand switch GDHIS0011B. Damage to these cables could prevent operation or cause maloperation of the supply fan. If this occurs, the Train B ESW pump room may have insufficient ventilation when the Train B ESW pump is operating.

Cable 14GDI04BA provides ESW B room temperature from temperature element GDTE0011 to temperature controller GDTC0011. Cables 14GDI04BB and 14GDI04BC provide signals from GDTC0011 to outside air intake damper GDTZ0011A and recirculation damper GDTZ0011B, respectively, to change position based on room temperature. Damage to these cables could prevent operation of the dampers. Temperature controls for Train A ESW pump room are unaffected by a fire in area C-6.

Power and control cables associated with a number of valves in the Train B ESW system are run in fire area C-6. Damage to the cables due to a fire could cause the spurious operation or prevent operation of the valves from the control room. If this occurs, redundant valves are available to ensure operability of the Train A ESW system.

Cable 14NGB10SB is associated with Train B ESW pump room load center NG06E feeder breaker NB0216. Cable 14NGG01SA is a power cable from NB0216 to XNG06. Damage to 14NGB10SB could cause the breaker to spuriously trip or spuriously close. Damage to 14NGG01SA could prevent operation of the breaker. Train A ESW pump room load center NG05E is unaffected by a fire in area C-6.

Based on the above discussion, Train B ESW may not be available if a fire occurs in fire area C-6. PFSSD is assured for a fire in area C-6 using Train A ESW pump PEF01A and associated components.

References: E-15000, XX-E-013, E-13EF02, E-13EF02A, E-13EF03, E-13EF06A, E-13EF11, E-K3EF01A, E-K3EF02, E-K3EF03, E-K3EF06, E-K3EF08, E-K3EF11, E-K3GD01A, E-K3GD04A, E-K3NG01, E-K3NG10A, E-1F9402A, E-1F9402B, E-1F9403, E-1F9443, M-12EF01, M-12EF02, M-K2EF01, M-K2GD01

5.2.4 Class 1E 4.16 kV ESF Switchgear Buses NB01 and NB02

One Class 1E 4.16 kV bus is required to power PFSSD equipment in the event of a fire. Bus NB01 normally powers Train A safety related equipment while Bus NB02 normally powers Train B safety related equipment. The normal source of power is from off-site sources while the safety-related source of power is from the emergency diesel generators. Each bus can be cross-trained to the opposite transformer.

Cables 16NBB05AA, 16NBB05AB and 16NBB05AC are power cables that provide the normal off-site source of power from transformer XNB02 to bus NB02. Damage to these cables will cause a loss of off-site power to XNB02. Based on Calculation XX-E-013, Appendix 2, off-site power can be lost to both safety-related buses NB01 and NB02. Therefore, off-site power to NB01 and NB02 could be lost in the event of a fire in this area. As discussed in Section 5.2.3, Train B ESW may not be available. Therefore, the Train B emergency diesel generator may not be available. The Train A emergency diesel generator remains available.

Based on the above discussion, off-site power to NB01 and NB02 could be lost if a fire occurs in this area and the Train B emergency diesel generator may not be available. The Train A emergency diesel generator remains available to energize NB01.

References: E-15000, XX-E-013, E-13NB03, E-13NB05, E-13NB06, E-1F9423

5.2.5 Residual Heat Removal System

The residual heat removal (RHR) system is required to remove decay heat from the RCS during transition from hot shutdown to cold shutdown. At least one RHR train is required to be operable for PFSSD.

A power cable (14EJB01BA) associated with Train B RHR pump motor DPEJ01B is run in fire area C-6. Damage to this cable will prevent operation of the Train B RHR pump. Redundant Train A RHR cables are run in a separate fire area and are unaffected by a fire in area C-6. Therefore, PFSSD is assured using Train A RHR if a fire occurs in area C-6.

References: XX-E-013, E-15000, E-13NB04, E-1F9205

5.2.6 Train A 480 Volt Class 1E Power

One train of class 1E 480 Volt power is required to be operable to energize the credited PFSSD components.

A fire in area C-6 could disrupt power to Train B 480 Volt Class 1E Load Centers NG02 and NG04. Cable 14NGG01AA supplies power from NB0213 to transformer XNG02. Loss of power to XNG02 will interrupt power to load center NG02. Cables 14NGG01AB and 14NGG01AC are power cables that supply power to motor control center (MCC) NG02A. Cable 14NGG01BA supplies power from NB0210 to transformer XNG04. Therefore, all power to NG02 and NG04 could be lost in the event of a fire in area C-6.

Logic diagrams E-1F9424B and E-1F9424D identify all PFSSD components affected by a loss of power to NG02 and NG04. If this occurs, power to redundant Train A components is available using load centers NG01 and NG03, which are unaffected by a fire in area C-6. Therefore, loss of power to Train B components supplied by NG02 and NG04 will not impact the ability to achieve and maintain safe shutdown following a fire in this area.

References: XX-E-013, E-15000, E-13NG01A, E-1F9424A, E-1F9424B, E-1F9424C, E-1F9424D

5.2.7 Non-Class 1E 125 VDC Power

Non-class 1E 125 VDC power is required to energize non-safety related equipment credited for PFSSD. The primary source of 125 VDC power is from inverters that transform 480 VAC to 125 VDC. The backup source of 125 VDC power is from storage batteries.

Cable 16PKG11BA is a power cable that provides 480 VAC power from NG0409 to inverter PK22, which energizes non-class 1E 125 VDC bus PK02. Damage to this cable will disrupt the primary source of power to PK02. Non-class 1E battery rack PK12 is unaffected by a fire in area C-6 and is available to supply short-term power to PK02

Cables associated with non-class 1E 125 VDC bus PK01 are unaffected by a fire in this area. Therefore, long term power remains available to PK01. Components credited for a fire in this area rely on PK01, so loss of PK02 will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-11PK01, E-11PK02, E-13PK11, E-1F9422C

5.2.8 Non-Class 1E 125 VDC Battery Charger PK24

Cable 16PKG13AA is the 480 VAC power cable from NG0410 to 125 VDC battery charger PK24. Damage to this cable could result in a loss of the PK24 power feed to 125 VDC bus PK04. PK04 supplies 125 VDC power to 10 kVA inverter PN04, which supplies backup 120 VAC power to RP043 and primary 120 VAC power to RP047.

Redundant power feed to the PK04 bus is unaffected by a fire in area C-6. This power feed originates from 125 VDC battery group PK14 and is normally aligned to feed power to PK04 in the event PK24 is lost.

Based on the above discussion, a fire in area C-6 could result in a loss of power to PK24 but redundant power source PK14 is available and is unaffected by the fire. In addition, redundant power to panels RP043 and RP047 is available from PN310. Therefore, 120 VAC power to panels RP043 and RP047 is available if a fire occurs in fire area C-6.

References: E-15000, XX-E-013, E-11NG02, E-11PK04, E-13PK13, E-1F9421, E-1F9422C

FIRE AREA C-7

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-7 is located on the 1984 elevation of the Control Building and includes the room listed in Table C-7-1.

Table C-7-1
Room Located in Fire Area C-7

ROOM #	DESCRIPTION
3230	Electrical Chase

Fire area C-7 is protected with an automatic wet-pipe sprinkler system and automatic smoke detection. The area is separated on all sides by minimum 3-hour fire resistance rated barriers.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-7-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-7-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-7

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
BB	Reactor Coolant System	R, M, H, P, S	Reactor coolant pumps A and B may not stop using the control room hand switch. RCP seal injection and thermal barrier cooling remain available. Therefore, the inability to stop the RCPs will have no adverse impact on PFSSD. Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, pressurizer spray can be stopped by closing KAFV0029 using KAHIS0029 in the main control room.
BG	Chemical and Volume Control System	R, M, S	Letdown isolation valves BGLCV0459 and BGLCV0460 and letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C may need to be failed closed by closing valve KAFV0029 using KAHIS0029 in the main control room.
BM	Steam Generator Blowdown System	R, M, H	Valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 can be isolated using respective handswitches in the main control room.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.

Table C-7-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-7

System	System Name	PFSSD Function*	Comments
EM	High Pressure Coolant Injection	R, M	It may be necessary to charge through the BIT if the letdown flowpath cannot be isolated. The BIT flowpath is available using either Train A or Train B charging pump. Flow diversion through the SIS test line, when charging through the BIT, is prevented by either isolating EMHV8871 or EMHV8964.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.

Table C-7-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-7

System	System Name	PFSSD Function*	Comments
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.

Table C-7-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-7

System	System Name	PFSSD Function*	Comments
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
RP	Miscellaneous Control Panels	R, M, H, P, S	PFSSD functions associated with RP211 are affected by a fire in area C-7. Redundant capability exists in a separate area and is unaffected by a fire in area C-7.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-7.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-7. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Normal Pressurizer Spray

Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, the spray can be stopped by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer pressure indication is available using BBPI0455A, BBPI0456, BBPI0457 and BBPI0458.

3.2.2 Isolation of Letdown

A fire in area C-7 could prevent valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B, and BGHV8149C from being closed using their associated control room hand switches. If this occurs, the valves can be closed by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer level indication is available using BBLI0459A and BBLI0460A.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None specific to PFSSD.

4.0 CONCLUSION

With some exceptions, redundant Post Fire Safe Shutdown capability exists if a severe fire occurs in area C-7. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-7.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-7

There are no PFSSD components located in area C-7. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-7-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-7. The applicable evaluation section is also listed in Table C-7-3.

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15BBA01AC	3230	DPBB01A	C	5.2.4	Reactor Coolant Pump A Motor
15BBA01BC	3230	DPBB01B	C	5.2.4	Reactor Coolant Pump B Motor
15BBI19AA	3230	BBPCV0455B	I	5.2.5	Pressurizer Spray Valve
15BBI19BA	3230	BBPCV0455C	I	5.2.5	Pressurizer Spray Valve
15BGK10AA	3230	BGLCV0459	C	5.2.1	Letdown Isolation Valve
15BGK10AD	3230	BGLCV0459	C	5.2.1	Letdown Isolation Valve
15BGK10BA	3230	BGLCV0460	C	5.2.1	Letdown Isolation Valve
15BGK10BD	3230	BGLCV0460	C	5.2.1	Letdown Isolation Valve
15BGK35AB	3230	BGHV8149A	C	5.2.1	Letdown Orifice Isolation Valve
15BGK35AD	3230	BGHV8149A	C	5.2.1	Letdown Orifice Isolation Valve
15BGK35BB	3230	BGHV8149B	C	5.2.1	Letdown Orifice Isolation Valve
15BGK35BD	3230	BGHV8149B	C	5.2.1	Letdown Orifice Isolation Valve
15BGK35CB	3230	BGHV8149C	C	5.2.1	Letdown Orifice Isolation Valve
15BGK35CD	3230	BGHV8149C	C	5.2.1	Letdown Orifice Isolation Valve
15BMK06AB	3230	BMHV0001	C	5.2.2	SG A to Blowdown Flash Tank Isolation Valve
15BMK06BB	3230	BMHV0002	C	5.2.2	SG B to Blowdown Flash Tank Isolation Valve
15BMK06CB	3230	BMHV0003	C	5.2.2	SG C to Blowdown Flash Tank Isolation Valve
15BMK06DB	3230	BMHV0004	C	5.2.2	SG D to Blowdown Flash Tank Isolation Valve
15EMK05EA	3230	EMHV8882	C	5.2.3	Boron Injection Downstream Test Line Iso Vlv
15RPK09EA	3230	RP211	P	5.2.2	Auxiliary Relay Rack

5.2.1 Letdown Isolation Valves

Valves BGLCV0459 and BGLCV0460 are isolation valves installed in series on the inlet side of the regenerative heat exchanger. PFSSD requires that either of these valves be closed.

Cables 15BGK10AA and 15BGK10AD are power/control cables for the BGLCV0459 solenoid valve (BGHY0459). Air supplied by an open (energized) solenoid valve will open valve BGLCV0459. A closed (de-energized) solenoid valve will cause loss of air pressure and closure of valve BGLCV0459.

Cables 15BGK10BA and 15BGK10BD are power/control cables for the BGLCV0460 solenoid valve (BGHY0460). Air supplied by an open (energized) solenoid valve will open valve BGLCV0460. A closed (de-energized) solenoid valve will cause loss of air pressure and closure of valve BGLCV0460.

Either BGLCV0459 or BGLCV0460 must be closed or letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C must be closed. The cables for BGLCV0459 or BGLCV0460 are routed in a common enclosure in cable trays. A hot short on the cables could cause the valves to open. A hot short on 15BGK10AA and 15BGK10BA prevents closing BGLCV0459 and BGLCV0460 from the control room. Other cables routed in the cable trays have the proper voltage for hot shorts. The hot shorts bypass MCB hand switches for BGLCV0459 and BGLCV0460. BGLCV0459 and BGLCV0460 constitute a high/low pressure interface. Therefore, multiple simultaneous hot shorts must be considered.

Letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C are listed as PFSSD components because of the interlock between these valves and BGLCV0459 and BGLCV0460. The interlock prevents closure of the letdown valves when any one or more orifice isolation valves are open. Cables associated with all three letdown orifice isolation valves are located in this fire area. Damage to these cables could prevent closure of the valves from the control room. Therefore, a fire in area C-7 will prevent closure of all three letdown orifice isolation valves (BGHV8149A, BGHV8149B, and BGHV8149C) as well as the two letdown isolation valves (BGLCV0459 and BGLCV0460).

Valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B, and BGHV8149C are air operated and fail in the closed position. The valves are located in containment. Instrument air to containment is controlled by valve KAFV0029, which is unaffected by a fire in area C-7. Hand switch KAHIS0029 can be used to close the valve from the control room and isolate instrument air to containment. Pressurizer level indication is available using BBLI0459A and BBLI0460A.

Based on the above discussion, letdown valves BGLCV0459 and BGLCV0460 and letdown orifice valves BGHV8149A, BGHV8149B, and BGHV8149C can be closed from the control room if a fire occurs in area C-7.

References: E-15000, XX-E-013, E-13BG10, E-13BG35, E-13KA02, E-1F9301, M-12BG01, M-12KA01

5.2.2 Steam Generator Blowdown to Blowdown Flash Tank Isolation Valve

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown. Cables 15BMK06AB, 15BMK06BB, 15BMK06CB and 15BMK06DB are associated with the BM157 panel mounted hand switches for each of the BMHV valves. Damage to these cables could impact the ability to close the valves from BM157 in the Radwaste Control Room. However, the normal means of closing these valves using the RL024 mounted hand switches in the Main Control Room remains available. Therefore, a fire in area C-7 will not prevent the closure of valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004.

Panel RP211 is an auxiliary relay rack located in room 1101. Power to this panel is supplied by PK5129 through cable 15RPK09EA. Loss of power to the relay panel will result in loss of power to relay 3XBM46. Calculation XX-E-013 identifies relay 3XBM46 as the only PFSSD related relay located in this enclosure. The function of this relay is to close valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004 if a blowdown and sample process isolation signal is received. Under normal conditions the relay is de-energized, the auxiliary contacts are closed, and valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004 are open.

Loss of power to relay 3XBM46 will result in a loss of automatic valve closure upon receipt of a blowdown and sample process isolation signal. However, the capability to isolate these valves from the control room is unaffected by the fire. In addition, valve position indication on the RL024 panel in the Main Control Room is unaffected by a fire in area C-7.

Based on the above discussion, a fire in area C-7 that damages cables 15BMK06AB, 15BMK06BB, 15BMK06CB, 15BMK06DB and 15RPK09EA will not prevent safe shutdown of the plant due to the availability of redundant capability located in a different fire area.

References: E-15000, XX-E-013, E-13BM04, E-13BM06A, E-13BM06C, E-13BM06D, E-093-00028, E-1F9101, M-12BM01

5.2.3 Boron Injection Tank Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

A fire in area C-7 will not result in a loss of seal injection. However, based on the discussion in 5.2.1, a fire in area C-7 has the possibility to cause a momentary loss of inventory through the letdown flow path until the letdown isolation valves are failed closed. Therefore, charging through the BIT flow path may be required for hot standby. In addition, as discussed above, the BIT flowpath is required for transition to cold shutdown.

To prevent CCP flow diversion through the SIS test line when charging through the BIT, valves EMHV8843 and EMHV8882 need to be closed. If either or both of these valves cannot be closed, then closing or maintaining closed either valve EMHV8871 or EMHV8964 will accomplish the PFSSD objective.

Cable 15EMK05EA is a control cable for EMHV8882. A hot short in cable 15EMK05EA will energize the solenoid and open valve EMHV8882. The cable is run in raceways with cables carrying the proper voltage and polarity for a cable to cable hot short. The hot short would bypass the control room handswitch (EMHIS8882) on RL018 and control of this valve from the control room would be lost.

CCP flow diversion through the SIS test line is prevented by valves EMHV8871 or EMHV8964. Cables associated with EMHV8871 and EMHV8964 are run in a different fire area. Therefore, the flow path can be isolated using either EMHV8871 or EMHV8964.

References: E-15000, XX-E-013, E-13EM05A, E-1F9302, M-12EM01, M-12EM02

5.2.4 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling or spuriously open pressurizer spray is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs. Calculation WCNOC-CP-002 shows that if pressurizer spray spuriously actuates, the spray flow needs to be stopped within 50 minutes.

One control cable associated with reactor coolant pumps A and B is run in fire area C-7. Damage to these cables in the event of a fire could prevent operators from stopping the A and B RCPs from the control room. However, a fire in C-7 will not cause a loss of all seal cooling since RCP seal injection and thermal barrier cooling remain available. As discussed in Section 5.2.5, if pressurizer spray spuriously operates, operators can stop the spray by isolating air to the valve from the control room. Therefore, tripping the RCPs is not required to mitigate spurious pressurizer spray.

Based on the above discussion, the inability to trip RCPs A and B from the control room will have no adverse impact on PFSSD. If pressurizer spray spuriously actuates, the valves can be closed by isolating air to the valves from the control room. In addition, seal injection and thermal barrier cooling are unaffected by a fire in area C-7. Therefore, the RCPs do not have to be tripped in the event of a fire in area C-7.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1, WCNOC-CP-002, CR 25002

5.2.5 Normal Pressurizer Spray

The normal pressurizer spray valves are included in the PFSSD design because spurious operation of pressurizer sprays can cause a decrease in pressure which can lead to boiling in the core. The pressurizer spray valves are part of the pressurizer pressure control system.

The pressurizer normal spray valves (BBPCV0455B and BBPCV0455C) operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

Cable 15BBI19AA associated with pressurizer spray valve BBPCV0455B, and cable 15BBI19BA associated with pressurizer spray valve BBPCV0455C are run in this area. Damage to these cables could cause the spurious opening of the spray valves.

The pressurizer spray valves are electro/pneumatic operated and loss of air pressure will close the valves. The air supply comes from the compressed air system. Closing valve KAFV0029 using KAHIS0029 on RL024 will isolate compressed air to containment which will cause the pressurizer spray valves to close or prevent them from opening. Based on WCNOC-CP-002, spray flow needs to be stopped within 50 minutes. Since this is a control room action, this can be completed well within 50 minutes.

Based on the above discussion, the pressurizer spray valves could spuriously open if a fire occurs in this area. Pressurizer spray can be stopped by closing valve KAFV0029 from the main control room. Pressurizer pressure indication is available using BBPI0455A, BBPI0456, BBPI0457 and BBPI0458.

References: E-15000, XX-E-013, E-13BB19, E-13KA02, M-744-00028, WCNOC-CP-002, CR 25002, DCP 13324

FIRE AREA C-8

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1.0 GENERAL AREA DESCRIPTION

Fire area C-8 is located on the 1984 elevation of the Control Building and includes the room listed in Table C-8-1.

Table C-8-1
Rooms Located in Fire Area C-8

ROOM #	DESCRIPTION
3229	South electrical chase.

Fire area C-8 is protected with an automatic wet-pipe sprinkler system and automatic smoke detection. The area is separated on all sides by minimum 3-hour fire resistance rated barriers.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-8-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-8-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-8

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
BB	Reactor Coolant System	R, M, H, P, S	Reactor coolant pumps C and D may not stop using the control room hand switch. RCP seal injection and thermal barrier cooling remain available. Therefore, the inability to stop the RCPs will have no adverse impact on PFSSD.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.

Table C-8-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-8

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.

Table C-8-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-8

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
PA	13.8kV	S	Breaker PA0207 could trip. This will not affect PFSSD since redundant capability is available.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.

Table C-8-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-8

System	System Name	PFSSD Function*	Comments
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-8.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-8. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-Fire Safe Shutdown capability is assured if a severe fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-8.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-8

There are no PFSSD components located in area C-8. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-8-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-8. The applicable evaluation section is also listed in Table C-8-3.

Table C-8-3
PFSSD Cables Located in Fire Area C-8

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16BBA01CC	3229	DPBB01C	C	5.2.1	Reactor Coolant Pump C Motor
16BBA01DC	3229	DPBB01D	C	5.2.1	Reactor Coolant Pump D Motor
16PGA11AC	3229	PA0207	C	5.2.2	Load Centers PG14, PG18, PG20 and PG24 Fdr Bkr

5.2.1 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs.

One control cable associated with reactor coolant pumps C and D is run in fire area C-8. Damage to these cables in the event of a fire could prevent operators from stopping the C and D RCPs from the control room. However, a fire in C-8 will not cause a loss of all seal cooling since RCP seal injection and thermal barrier cooling remain available.

Based on the above discussion, the inability to trip the C and D RCPs from the control room will have no adverse impact on PFSSD. The pumps can continue to operate, providing forced flow circulation. If the pumps spuriously stop, natural circulation cooldown can be used.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1

5.2.2 Load Center Feeder Breaker PA0207

Load center feeder breaker PA0207 is credited for PFSSD because it supplies power to credited non-safety related loads. Cable 16PGA11AC, associated with PA0207, runs in this area. A fire induced short circuit in this cable will trip the associated breaker.

Breaker PA0207 supplies power to the following PFSSD components:

- PG20GBR217 – MCB Misc. Power Circuits RL023
- PG20GER5 – Instr. Bus Transformer Alt. Feed XPN08D

PFSSD components powered from PG20GBR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG20GER5 is credited as one source of power to PN08. The redundant source of power from NG02BBF1 is unaffected by a fire in this area.

Based on the above discussion, loss of breaker PA0207 will not adversely affect PFSSD if a fire occurs in this area.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-11PK02, E-13PG10, E-13PG11, E-13RL07, E-13SC12, E-1F9421, E-1F9422C, KD-7496

FIRE AREA C-9

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1.0 GENERAL AREA DESCRIPTION

Fire area C-9 is located on the 2000'-0" elevation of the Control Building and includes the rooms listed in Table C-9-1.

Table C-9-1
Rooms Located in Fire Area C-9

ROOM #	DESCRIPTION
3301	Train A Engineered Safety Features Switchgear Room

Fire area C-9 is protected with an automatic Halon fire suppression system. In addition, automatic fire detection is installed throughout.

Fire Area C-9 primarily contains cables and equipment for Train A and non-safety related components. Redundant Train B cables and components are located in a separate fire area divided by 3-hour fire rated construction. The 3-hour fire rated barrier provides reasonable assurance that a fire in area C-9 will not affect Train B components and therefore the ability to achieve and maintain safe shutdown in the event of a fire in area C-9 is assured.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-9-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-9-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-9

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
AL	Aux. Feedwater System	H, P	Train A motor driven auxiliary feedwater pump and the turbine driven auxiliary feedwater pump may not be available. Train B motor driven auxiliary feedwater pump is available and is unaffected by the fire.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
BB	Reactor Coolant System	R, M, H, P, S	Pressurizer PORV Block Valve BBHV8000A may not close. However, PORV BBPCV0455A is unaffected by the fire.
BG	Chemical and Volume Control System	R, M, S	Train A CVCS components may not be available. Train B CVCS components are available and are unaffected by the fire. VCT isolation valve BGLCV0112B may not operate. VCT isolation valve BGLCV0112C is available. Seal injection using Train A flow throttling valve BGHV8357A may not be available. Train B flow throttling valve BGHV8357B is available.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
BN	Borated Refueling Water Storage System	R, M, H	The Train A CCP suction isolation valve from the RWST (BNLCV0112D) may not open. Train B CCP suction isolation valve BNLCV0112E is available. The Train A RHR suction isolation valve from the RWST (BNHV8812A) may not open. Train B RHR suction isolation valve BNHV8812B is available.
EF	Essential Service Water System	H, S	Several Train A ESW components may be affected by a fire in this area. Train B ESW remains available.
EG	Component Cooling Water System	S	Train A CCW pumps PEG01A and PEG01C may be affected. Train B CCW system is available.
EJ	Residual Heat Removal System	M, H, P	Train A RHR pump and miniflow valve EJFCV0610 may be affected. Train B RHR system remains available.
EM	High Pressure Coolant Injection	R, M	Safety Injection pump PEM01A could spuriously start. This can be mitigated by de-energizing the NB01 bus.

Table C-9-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-9

System	System Name	PFSSD Function*	Comments
EN	Containment Spray	R, M	Containment Spray pump PEN01A could spuriously start. This can be mitigated by de-energizing the NB01 bus.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
FC	Auxiliary Turbines	R, H, P	Valves FCHV0312 and FCFV0313 may be affected by the fire, preventing steam flow to the turbine driven auxiliary feedwater pump. The Train B motor driven auxiliary feedwater pump is unaffected. Valve FCFV0005 may be affected. The MSIVs can be closed using all-close hand switches ABHS0079 or ABHS0080.
GD	ESW Pump House HVAC	S	Train A ESW pump room supply fan CGD01A may not be available. Train B ESW pump room supply fan CGD01B is unaffected.
GF	AFW Pump Room Coolers	S	Train A AFW pump room cooler SGF02A may not be available. Train B AFW pump room cooler SGF02B is unaffected.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The Train A control room and Class 1E room coolers may be affected. The Train B room coolers remain available.
GL	Auxiliary Building HVAC	S	The Train A RHR pump room cooler SGL10A, CCP pump room cooler SGL12A and CCW pump room cooler SGL11A may be affected. Train B room coolers are available.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.

Table C-9-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-9

System	System Name	PFSSD Function*	Comments
KJ	Standby Diesel Engine	S	Power to Train A diesel engine control panel KJ121 could be lost. Train B diesel engine is available.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
NB	4.16 kV System	S	Several components associated with Train A 4.16 kV system may be affected. Train B 4.16 kV system is unaffected.
NE	Standby Diesel Generator	S	The Train A diesel generator may be affected. The Train B diesel generator is available.
NF	Load Shed and Emergency Load Sequencing	S	Cables associated with all four undervoltage relays on Train A are run in area C-9. Cables associated with two of the four undervoltage relays on Train B are run in area C-9. Emergency load shed/sequencer operates when 2/4 UV relays sense undervoltage on the bus. Therefore, Train B Load Shed and Emergency Load Sequencing will be available.
NG	480V Load Centers and MCCs	S	Train A 480 V load centers may be affected. Train B 480 V load centers are available.
NK	125VDC	S	Train A 125 VDC Swing Battery Charger NK25 is affected. Redundant Train B Swing Battery Charger NK26 is unaffected. Train A Swing Inverter NN15 DC power source selector switch NK79 may be affected. Train B Swing Inverter NN16 DC power source selector switch NK80 is unaffected.
NN	120VAC	S	The Train A 120 VAC distribution system may be affected. The Train B 120 VAC system is unaffected.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
PK	125VDC	S	Battery charger PK21 may be affected. Redundant charger PK22 is unaffected.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.

Table C-9-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-9

System	System Name	PFSSD Function*	Comments
PN	120VAC	S	One of the two power feeds to non-class 1E 120 VAC panel PN07 may be affected. The redundant power feed to PN07 remains available. Both power feeds to panel PN08 are unaffected.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
RP	Miscellaneous Control Panels	R, M, H, P, S	Relay panel RP139 may be affected. Redundant relay panel RP140 is unaffected.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-9.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-9. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 De-Energize the NB01 Bus

To mitigate spurious operation of Train A equipment, de-energize the NB01 bus to disable power to the equipment. To ensure NB01 is completely de-energized, place 1HS-SY018 and 1HS-SY022 in pull-to-lock to open switchyard breakers 13-8 and 13-48, respectively. It may also be necessary to de-energize XNB02 if alternate feeder breaker NB0109 spuriously closes. This can be done by opening breaker PA0201 by placing NBHIS0001 in pull-to-lock. If the Train A diesel generator spuriously starts due to loss of power to the bus, then stop the diesel locally using any available means.

3.2.2 Component Cooling Water

Train A CCW could be affected by a fire in this area. If this occurs, swap to Train B CCW using normal operating procedures if Train B CCW is not already running.

3.2.3 Reactor Coolant Pump Seal Cooling

If Train A CCW is operating at the time of the fire, it could be lost causing a temporary loss of thermal barrier cooling. The normal charging pump is not analyzed and is assumed lost. Operators should swap to Train B CCW to restore thermal barrier cooling and line up the Train B CCP to restore RCP seal injection.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

With some exceptions, redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-9.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-9

PFSSD components (S. in E-15000) located in fire area C-9 are shown in Table C-9-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table C-9-3.

Table C-9-3
PFSSD Equipment Located in Fire Area C-9

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
3301	BBHS8000C	Pressurizer PORV Isolation Valve BBHV8000A Hand Sw.	5.1.1	
3301	NB01	Train A Class 1E 4.16 kV ESF Switchgear Bus	5.1.2 5.1.3	See 5.1.2 for list of breakers. See 5.1.3 for list of breaker-mounted hand switches.
3301	NG01	Train A 480 Volt Class 1E Load Center	5.1.4	See 5.1.4 for list of breakers.
3301	NG01A	Train A 480 Volt Class 1E Control Building MCC	5.1.5	See 5.1.5 for list of breakers.
3301	NG03	Train A 480 Volt Class 1E Load Center	5.1.6	See 5.1.6 for list of breakers.
3301	NK25	125 VDC Swing Battery Charger	5.1.7	
3301	NK75	Swing Battery Charger NK25 DC Power Transfer Sw	5.1.7	
3301	NK77	Swing Battery Charger NK25 AC Power Transfer Sw	5.1.7	
3301	NK79	Swing Inverter NN15 DC Power Transfer Switch	5.2.18	
3301	NKHS0025	Swing Battery Charger NK25 AC Pwr Transfer HS	5.1.7	
3301	NKHS0109	Swing Battery Charger NK25 Brkr Ctrl Handswitch	5.1.7	
3301	NN15	7.5 KVA Swing Inverter	5.2.18	
3301	PTNB101/B	NB01 Degraded Voltage Potential Transformer	5.2.17	
3301	PTNB113/B	NB01 Degraded Voltage Potential Transformer	5.2.17	
3301	PTNB116/B	NB01 Degraded Voltage Potential Transformer	5.2.17	
3301	PTNB117/B	NB01 Degraded Voltage Potential Transformer	5.2.17	
3301	RP139	Auxiliary Relay Rack	5.1.8	See 5.1.8 for a list of relays.
3301	XNG01	480V Class 1E Load Center Xfmr - Ctrl Bldg	5.1.4	
3301	XNG03	480V Class 1E Load Center Xfmr - Ctrl Bldg	5.1.6	
3301	PN09	Non-Class 1E 120 VAC Inverter	5.1.9	

Table C-9-3 PFSSD Equipment Located in Fire Area C-9				
Room #	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
3301	PN09A	Non-Class 1E 120 VAC Distribution Panel	5.1.9	

5.1.1 Pressurizer PORV Block Valve BBHV8000A

Hand switch BBHS8000C is used to isolate the control room from the valve control circuit and allows manual closure of the valve at the Motor Control Center. Damage to this switch due to a fire could prevent operation of valve BBHV8000A from the control room. Valve BBHV8000A is required to be closed for PFSSD, or pressurizer PORV BBPCV0455A is required to be closed. Cables for pressurizer PORV BBPCV0455A do not run through area C-9 and are therefore unaffected by a fire in C-9.

Cables 11BBG39AF and 11BBG39AJ, associated with block valve BBHV8000A, are also run through area C-9 and may be damaged by a fire, preventing operation of the valve. This is acceptable for PFSSD as long as PORV BBPCV0455A is able to perform its intended function.

A fire in area C-9 could impact the ability to operate valve BBHV8000A. However, pressurizer PORV BBPCV0455A is unaffected by a fire in area C-9 and remains available to perform its intended function.

References: XX-E-013, E-15000, E-13BB39, E-13BB40, E-1F9301

5.1.2 Train A Class 1E 4.16 kV ESF Switchgear Bus NB01

Bus NB01 supplies power to Train A Engineered Safety Features (ESF) components. A fire in area C-9 could damage NB01 and associated feeder breakers and disrupt power to all Train A ESF components. The following table identifies the NB01 PFSSD feeder breakers that could be lost in the event of a fire in area C-9.

Class 1E 4.16 kV ESF Switchgear Bus NB01	
Feeder Breaker	**Description**
NB0101	RHR Pump A
NB0102	Containment Spray Pump A
NB0103	Safety Injection Pump A
NB0104	Centrifugal Charging Pump A
NB0105	Auxiliary Feedwater Pump A
NB0107	Component Cooling Water Pump A
NB0108	Component Cooling Water Pump C
NB0109	NB01 to XNB02 Transformer
NB0110	480 Volt Load Center NG03
NB0111	Diesel Generator A to NB01
NB0112	ESF XFMR XNB01 to NB01
NB0113	480 Volt Load Center NG01
NB0115	ESW Pump A
NB0116	480 Volt Load Center NG05
NB0117	125 VDC Control Power for NB0101 to NB0117

Control cables associated with these breakers are also run in area C-9. Damage to these cables could cause a loss of capability of the associated equipment. In addition, bus NB01 control room monitoring circuits are located in the area and damage could cause loss of control room monitoring capability.

The main power cables from XNB01 to bus NB01 are run in area C-9. In addition, cables associated with differential protective relay 287/T1 are run in area C-9. Damage to these cables could disrupt power to bus NB01.

Control cables associated with the bus NB01 Synchro-scope and associated switches are run in area C-9. Damage to these cables could prevent some of the monitoring functions for NB01 but would not cause a loss of the NB01 bus.

Redundant Train B ESF components, supplied by NB02, are unaffected by a fire in area C-9. Therefore, loss of power to Train A components identified in the above table due to a fire in area C-9 will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-13NB01, E-13NB02, E-13NB03, E-13NB05, E-13NB13, E-13NE01, E-13NG01A, E-13NG10, E-K3NG01, E-K3NG10

5.1.3 Local Switchgear Mounted Hand Switches

Several local switchgear mounted hand switches are located in area C-9 and could be damaged by a fire, causing the switch contacts to fail in an undesired position. The following table lists each hand switch as well as a description of what the switch serves.

Local Switchgear Mounted Hand Switches on NB01	
Hand Switch	**Description**
NB0102HIS	Containment Spray Pump A
NB0103HIS	Safety Injection Pump A
NB0107HIS	Component Cooling Water Pump A
NB0108HIS	Component Cooling Water Pump C
NB0109HIS	NB01 to XNB02 Transformer
NB0112HIS	ESF XFMR XNB01 to NB01
NB0115HIS	ESW Pump A

Damage to any of these hand switches could cause spurious actuation of the component, which may be undesirable for PFSSD. To prevent maloperation of Train A components, the NB01 bus can be completely de-energized as described in the following paragraphs. In addition, de-energizing the bus ensures the safety of the fire brigade fighting the fire.

If a fire occurs in area C-9, operators can de-energize the NB01 bus by placing hand switches NBHIS0002 (NB01 normal supply breaker NB0112), NBHIS0003 (NB01 alternate supply breaker NB0109), and NEHIS0025 (NB01 emergency supply breaker NB0111) in pull-to-lock. The hand switches are located in the control room but the breakers are located in the fire affected area. If the control room hand switches do not work due to damage to one or more of these breakers, operators can open switchyard breakers 13-8 (Alternate feeder to XNB01) or 13-48 (Normal feeder to XNB01) to de-energize transformer XNB01. This is done by placing control room hand switches 1HS-SY018 (13-8) or 1HS-SY022 (13-48) in pull-to-lock. Cables associated with these hand switches do not run through area C-9.

If the A Train diesel generator NE01 starts upon loss of power to the NB01 bus, and breaker NB0111 closes, then it may be necessary to stop the diesel to prevent energizing the NB01 bus. This can be done using control room hand switch KJHS0008A. If control power is lost due to the fire and KJHS0008A is ineffective in shutting down the diesel, then operators can stop the diesel locally using any method available. Access to the diesel generator room is available without having to traverse through area C-9.

A fire may also cause spurious closure of normally open breaker NB0109, which provides power to NB01 from XNB02. If this occurs, operators can de-energize XNB02 and use Train B diesel generator NE02 to supply power to NB02. To de-energize NB02, operators can open breaker NB0209 by placing control room hand switch NBHIS0004 in pull-to-lock and open breaker PA0201 by placing control room hand switch NBHIS0001 in pull-to-lock.

References: XX-E-013, E-15000, E-13EN01, E-13NB01, E-13NB02, E-13NB03, E-13NB05, E-13NB13, E-13NE01, E-03NG01, E-1000-SY00, E-1000-SY12, E-1000-UU00, E-1005-SY01, E-1005-SY07, KD-7496, SYS NB-320

5.1.4 Train A 480 Volt Class 1E Load Center NG01

A fire in area C-9 could disrupt power to 480 Volt Class 1E Load Center NG01 and associated components. The following table identifies the NG01 PFSSD feeder breakers that could be lost in the event of a fire in area C-9.

Train A Class 1E 480 Volt Load Center NG01	
Feeder Breaker	**Description**
NG0101	Transformer XNG01 to Bus NG01
NG0102	125 Volt Non-Vital Battery Charger PK21
NG0103	125 Volt Vital Battery Charger NK21
NG0105	Train A Control Room A/C Unit
NG0106	Control Building MCC NG01A
NG0107	Auxiliary Building MCC NG01B
NG0108	Train A Containment Cooler (DSGN01A)
NG0109	125 Volt Swing Battery Charger NK25

In addition, load center NG01 transformer XNG01 is located in area C-9 and could be damaged by the fire.

Power and control cables associated with the equipment shown in the above table are also run in area C-9. These cables are listed in Table C-9-4. Damage to these cables due to a fire could cause a loss of the associated equipment.

Cables supplying 125 VDC control power to NG01 breakers from NK51 are run in area C-9. Damage to these cables could prevent operation of the breakers listed in the above table.

Redundant Train B components, supplied by NG02, are unaffected by a fire in area C-9. Therefore, loss of power to Train A components identified in the above table due to a fire in area C-9 will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11NG01, E-13NG01A, E-13NG11, E-13PK10

5.1.5 Train A 480 Volt Class 1E Control Building MCC NG01A

A fire in area C-9 could disrupt power to 480 Volt Class 1E Control Building MCC NG01A and associated components. The following table identifies the NG01A PFSSD MCC breakers that could be lost in the event of a fire in area C-9.

Train A 480 Volt Load Class 1E Control Building MCC NG01A	
MCC Breaker	**Description**
NG01AAF4	Class 1E Electrical Equip A/C Unit (SGK05A)
NG01AAF7	Incoming Line From Load Center NG01
NG01ABF1	Instr Bus Xfmr - Fed By NG01BEF4 (XPN07)
NG01ACF3	RHR Pump Room Cooler Motor (DSGL10A)
NG01ACF5	CCP A Miniflow Isolation Valve (BGHV8110)
NG01ACF6	RHR Mini Flow Iso Valve Loop A (EJFCV610)
NG01ACR1	Train A Control Building 480 Volt Distribution Panel
NG01ACR2	RWST To RHR Pump A Suction Valve (BNHV8812A)
NG01ACR3	Bypass Voltage Regulating Transformer (NN11)
NG01ADF1	Relay Panel
NG01AEF1	Charging Pump A RWST Suction Vlv (BNLCV112D)
NG01AEF3	Terminal Board Section
NG01AER1	ESW A To Ultimate Heat Sink Iso Vlv (EFHV37)
NG01AFF2	VCT Outlet Isolation Valve (BGLCV112B)
NG01AFR3	ESW B To Service Wtr Isolation Vlv (EFHV42)
NG01AFR4	ESW A To Service Wtr Isolation Vlv (EFHV41)
NG01AGF1	ESW A To Service Wtr Cross Connect Vlv (EFHV23)
NG01AGF2	ESW B To Service Wtr Cross Connect Vlv (EFHV24)
NG01AGF3	Bypass Voltage Regulating Transformer (NN13)
NG01AGF4	Bypass Voltage Regulating Transformer (NN15)
NG01AGR1	Centrifugal Charging Pmp Rm Cooler (DSGL12A)
NG01AGR4	CCP A Discharge To RCP Seals Vlv (BGHV8357A)

Power and control cables associated with the equipment shown in the above table are also run in area C-9. These cables are listed in Table C-9-4. Damage to these cables due to a fire could cause a loss of the associated equipment.

Redundant Train B components, supplied by NG02A, are unaffected by a fire in area C-9. Therefore, loss of power to Train A components identified in the above table due to a fire in area C-9 will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11NG01, E-13NG01A, E-13NN01

5.1.6 Train A 480 Volt Class 1E Load Center NG03

A fire in area C-9 could disrupt power to 480 Volt Class 1E Load Center NG03 and associated components. The following table identifies the NG03 PFSSD feeder breakers that could be lost in the event of a fire in area C-9.

Train A Class 1E 480 Volt Load Center NG03	
Feeder Breaker	**Description**
NG0301	Transformer XNG03 to Bus NG03
NG0303	125 Volt Vital Battery Charger NK23
NG0305	Train A Containment Cooler (DSGN01C)
NG0306	Auxiliary Building MCC NG03C
NG0307	Train A Diesel Generator Room MCC NG03D
NG0308	Train A Diesel Generator Room Supply Fan (DCGM01A)

In addition, load center NG03 transformer XNG03 is located in area C-9 and could be damaged by the fire.

Power and control cables associated with the equipment shown in the above table are also run in area C-9. These cables are listed in Table C-9-4. Damage to these cables due to a fire could cause a loss of the associated equipment.

Cables supplying 125 VDC control power to NG03 breakers from NK51 are run in area C-9. Damage to these cables could prevent operation of the breakers listed in the above table.

Redundant Train B components, supplied by NG04, are unaffected by a fire in area C-9. Therefore, loss of power to Train A components identified in the above table due to a fire in area C-9 will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11NG01, E-13NG01A, E-13NG11

5.1.7 Swing Battery Charger NK25

Swing battery charger NK25 provides backup power and battery charging to Train A 125 VDC busses NK01 and NK03 and battery banks NK11 and NK13. Swing battery charger NK25 allows battery chargers NK21 or NK23 to be taken out of service without loss of power to NK01 or NK03. A fire in area C-9 could cause damage to battery charger NK25, or could cause a loss of 480 VAC power to the battery charger, which would render it inoperable. In addition, the fire could cause damage to the power cables between NK25 transfer switch NK75 and transfer switches NK71 and NK73.

Battery chargers NK21 and NK23, and battery banks NK11 and NK13 are located in a different fire area. However, cables supplying 480 VAC power to battery chargers NK21 and NK23 are run in area C-9. Power to these chargers is supplied by 480 VAC breakers NG0103 (NK21) and NG0303 (NK23). In the event a fire in C-9 damages battery charger NK25, and disrupts charging power to NK21 and NK23, power to Train A busses NK01 and NK03 will still be available through battery banks NK11 and NK13, since the batteries are unaffected by a fire in area C-9. In the event power to NK01 and NK03 is unavailable, redundant Train B 125 VDC system remains available.

Transfer switches NK75 and NK77 are also located in area C-9. Damage to these switches and associated cables due to a fire will have no adverse impact on safe shutdown due to the availability of redundant Train B components in a different fire area.

Hand switches NKHS0109 and NKHS0025 may also be damaged by the fire. However, due to the availability of Train B 125 VDC system, this will have no adverse impact on PFSSD.

Based on the above discussion, a loss of swing battery charger NK25 and associated transfer switches will not adversely impact the ability to achieve and maintain safe shutdown due to the availability of redundant Train B components.

References: XX-E-013, E-15000, E-11NK01, E-11NK02, E-13NK10, E-13NK12

5.1.8 Auxiliary Relay Rack RP139

Relay rack RP139 contains a number of PFSSD relays used for operation of Train A equipment. The following table identifies the PFSSD relays located in panel RP139.

RP139 Auxiliary Relays	
Relay #	**Description**
1XEF31	ESW Pump Motor A Interposing Relay
1XEF33	ESW Pump Motor A Interposing Relay
1XEF35	ESW Pump Motor A Interposing Relay
3XEG01	CCW Pump A Auxiliary Relay
3XEG03	CCW Pump C Auxiliary Relay
62XBB01	Pressurizer PORV Block Valve Auxiliary Relay
62XBB03	Pressurizer PORV Block Valve Auxiliary Relay
63TDEEG02	CCW Pump A Auxiliary Relay
63TDEEG04	CCW Pump C Auxiliary Relay
83XGK03	GKHZ0029A/29B Auxiliary Relay
K1119	Load Sequencer Relay

A fire in area C-9 could damage panel RP139 and associated PFSSD relays shown in the above table. In addition, cables supplying 125 VDC and 120 VAC power to the various relays within RP139 are run in area C-9. Damage to the power cables and/or relays could prevent operation of the associated component, or could cause the component to spuriously operate. If the components spuriously operate, PFSSD is assured since spurious operation of these components will not have an adverse impact on the ability to achieve and maintain PFSSD.

Redundant relay panel RP140, containing redundant PFSSD relays for Train B components, is located in fire area C-10 and is unaffected by a fire in area C-9. Cables associated with RP140 do not run through area C-9.

References: XX-E-013, E-15000, E-13RP09

5.1.9 Steam Generator Feedwater Pumps

Main feedwater pump steam supply valves FCFV0005 and FCFV0105 are credited in the PFSSD analysis to trip the main feedwater pumps if the main steam isolation valves (MSIVs) are affected by a fire. Closing the MSIVs stops steam flow to the feedwater pumps' turbines and stops the feedwater pumps. The steam generator feedwater pumps are tripped in the event of a fire to prevent overfilling the steam generators.

Non-Class 1E 120 VAC Inverter PN09 and distribution panel PN09A provide power to FCFV0005 trip relays in panel FC169C. Cable 15RPY10AA supplies power from PN0712 to

inverter PN09. Cable 15RPY10AB supplies power from inverter PN09 to distribution panel PN09A. Cable 15FCY35AA provides the primary source of 120 VAC power from distribution panel PN09A to panel FC169A, which distributes power to the trip relays in panel FC169C. The alternate source of power to panel FC169A is not credited for PFSSD and is assumed lost.

A fire in area C-9 could damage inverter PN09, distribution panel PN09A or cables 15FCY35AA, 15RPY10AA and 15RPY10AB. If this occurs, operators in the control room would not be able to close valve FCFV0005 to stop steam flow to steam generator feedwater pump PAE01A.

A fire in area C-9 will not affect the ability to close the MSIVs from the control room. All-close hand switches ABHS0079 and ABHS0080 are unaffected and can be used to close the MSIVs from the control room.

Based on the above discussion, valve FCFV0005 may not close if a fire occurs in this area. However, the MSIVs can be closed using either hand switch ABHS0079 or ABHS0080 in the main control room. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-13FC35, E-13RP10, E-1F9103, E-1F9421

5.2 PFSSD CABLE EVALUATION

Table C-9-4 lists all the PFSSD cables (S. in E-15000) located in fire area C-9. The applicable evaluation section is also listed in Table C-9-4.

Table C-9-4
PFSSD Cables Located in Fire Area C-9

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ALB01AA	3301	DPAL01A	P	5.2.1	Auxiliary Feedwater Pump A
11ALB01AB	3301	DPAL01A	C	5.2.1	Auxiliary Feedwater Pump A
11ALB01AW	3301	DPAL01A	C	5.2.1	Auxiliary Feedwater Pump A
11BBG39AF	3301	BBHV8000A	C	5.1.1	Pressurizer PORV Block Valve
11BBG39AJ	3301	BBHV8000A	C	5.1.1	Pressurizer PORV Block Valve
11BGB01AA	3301	DPBG05A	P	5.2.2	Centrifugal Charging Pump A
11BGB01AB	3301	DPBG05A	C	5.2.2	Centrifugal Charging Pump A
11BGG11CA	3301	BGHV8110	P	5.2.2	Centrifugal Charging Pump A Mini Flow Valve
11BGG11CB	3301	BGHV8110	C	5.2.2	Centrifugal Charging Pump A Mini Flow Valve
11BGG11CC	3301	BGHV8110	C	5.2.2	Centrifugal Charging Pump A Mini Flow Valve
11BGG11CD	3301	BGHV8110	C	5.2.2	Centrifugal Charging Pump A Mini Flow Valve
11BGG12AA	3301	BGLCV0112B	P	5.2.3	Volume Control Tank Isolation Valve
11BGG12AB	3301	BGLCV0112B	C	5.2.3	Volume Control Tank Isolation Valve
11BGG12AC	3301	BGLCV0112B	C	5.2.3	Volume Control Tank Isolation Valve
11BGG12AD	3301	BGLCV0112B	C	5.2.3	Volume Control Tank Isolation Valve
11BGG12AE	3301	BGLCV0112B	C	5.2.3	Volume Control Tank Isolation Valve
11BGG52AA	3301	BGHV8357A	P	5.2.4	RCP Seal Injection Flow Throttling Valve
11BGG52AB	3301	BGHV8357A	C	5.2.4	RCP Seal Injection Flow Throttling Valve
11BGG52AC	3301	BGHV8357A	C	5.2.4	RCP Seal Injection Flow Throttling Valve
11BNG01AA	3301	BNLCV0112D	P	5.2.5	RWST to Charging Pump A Iso Valve
11BNG01AB	3301	BNLCV0112D	C	5.2.5	RWST to Charging Pump A Iso Valve
11BNG01AC	3301	BNLCV0112D	C	5.2.5	RWST to Charging Pump A Iso Valve
11BNG01AD	3301	BNLCV0112D	C	5.2.5	RWST to Charging Pump A Iso Valve

Table C-9-4
PFSSD Cables Located in Fire Area C-9

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BNG03AA	3301	BNHV8812A	P	5.2.6	RWST to RHR Pump A Iso Valve
11BNG03AB	3301	BNHV8812A	C	5.2.6	RWST to RHR Pump A Iso Valve
11BNG03AC	3301	BNHV8812A	C	5.2.6	RWST to RHR Pump A Iso Valve
11BNG03AE	3301	BNHV8812A	C	5.2.6	RWST to RHR Pump A Iso Valve
11EFB01SA	3301	PEF01A	C	5.2.7	ESW Pump A
11EFB01SC	3301	PEF01A	C	5.2.7	ESW Pump A
11EFB01SE	3301	PEF01A	P	5.2.7	ESW Pump A
11EFB01SF	3301	PEF01A	P	5.2.7	ESW Pump A
11EFG02AA	3301	EFHV0023	P	5.2.8	ESW to Service Water Isolation Valve
11EFG02AB	3301	EFHV0023	C	5.2.8	ESW to Service Water Isolation Valve
11EFG02AC	3301	EFHV0023	C	5.2.8	ESW to Service Water Isolation Valve
11EFG02AD	3301	EFHV0023	C	5.2.8	ESW to Service Water Isolation Valve
11EFG02AE	3301	EFHV0023	C	5.2.8	ESW to Service Water Isolation Valve
11EFG02AF	3301	EFHV0023	C	5.2.8	ESW to Service Water Isolation Valve
11EFG02BA	3301	EFHV0024	P	5.2.8	ESW to Service Water Isolation Valve
11EFG02BB	3301	EFHV0024	C	5.2.8	ESW to Service Water Isolation Valve
11EFG02BC	3301	EFHV0024	C	5.2.8	ESW to Service Water Isolation Valve
11EFG02BD	3301	EFHV0024	C	5.2.8	ESW to Service Water Isolation Valve
11EFG02BE	3301	EFHV0024	C	5.2.8	ESW to Service Water Isolation Valve
11EFG02BF	3301	EFHV0024	C	5.2.8	ESW to Service Water Isolation Valve
11EFG02SD	3301	FEF01A	C	5.2.7	Train A ESW Traveling Water Screen
11EFG03CA	3301	EFHV0041	P	5.2.8	ESW to Service Water Isolation Valve
11EFG03CB	3301	EFHV0041	C	5.2.8	ESW to Service Water Isolation Valve

Table C-9-4
PFSSD Cables Located in Fire Area C-9

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EFG03CC	3301	EFHV0041	C	5.2.8	ESW to Service Water Isolation Valve
11EFG03CD	3301	EFHV0041	C	5.2.8	ESW to Service Water Isolation Valve
11EFG03CE	3301	EFHV0041	C	5.2.8	ESW to Service Water Isolation Valve
11EFG03DA	3301	EFHV0042	P	5.2.8	ESW to Service Water Isolation Valve
11EFG03DB	3301	EFHV0042	C	5.2.8	ESW to Service Water Isolation Valve
11EFG03DC	3301	EFHV0042	C	5.2.8	ESW to Service Water Isolation Valve
11EFG03DD	3301	EFHV0042	C	5.2.8	ESW to Service Water Isolation Valve
11EFG03DE	3301	EFHV0042	C	5.2.8	ESW to Service Water Isolation Valve
11EFG03SD	3301	EFHV0091	C	5.2.7	ESW Screen Wash Water Valve
11EFG06AA	3301	EFHV0037	P	5.2.8	ESW to UHS Isolation Valve
11EFG06AB	3301	EFHV0037	C	5.2.8	ESW to UHS Isolation Valve
11EFG06AC	3301	EFHV0037	C	5.2.8	ESW to UHS Isolation Valve
11EFG06SD	3301	EFHV0097	C	5.2.7	ESW Pump A Air Release Valve
11EFG06SE	3301	EFHV0097	C	5.2.7	ESW Pump A Air Release Valve
11EFK01SB	3301	PEF01A	C	5.2.7	ESW Pump A
11EFY10CA	3301	EFHV0097	C	5.2.7	ESW Pump Air Release Valve Time Delay Relay
11EGB01AA	3301	PEG01A	P	5.2.9	Train A Component Cooling Water Pump
11EGB01AB	3301	PEG01A	C	5.2.9	Train A Component Cooling Water Pump
11EGB01AC	3301	PEG01A	C	5.2.9	Train A Component Cooling Water Pump
11EGB01AD	3301	PEG01A	C	5.2.9	Train A Component Cooling Water Pump
11EGB01AE	3301	PEG01A	C	5.2.9	Train A Component Cooling Water Pump
11EGB01AG	3301	PEG01A	C	5.2.9	Train A Component Cooling Water Pump

Table C-9-4
PFSSD Cables Located in Fire Area C-9

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EGB01AH	3301	PEG01A	C	5.2.9	Train A Component Cooling Water Pump
11EGB01AK	3301	PEG01A	C	5.2.9	Train A Component Cooling Water Pump
11EGB01AL	3301	PEG01A	C	5.2.9	Train A Component Cooling Water Pump
11EGB01CA	3301	PEG01C	P	5.2.9	Train A Component Cooling Water Pump
11EGB01CB	3301	PEG01C	C	5.2.9	Train A Component Cooling Water Pump
11EGB01CC	3301	PEG01C	C	5.2.9	Train A Component Cooling Water Pump
11EGB01CD	3301	PEG01C	C	5.2.9	Train A Component Cooling Water Pump
11EGB01CE	3301	PEG01C	C	5.2.9	Train A Component Cooling Water Pump
11EGB01CG	3301	PEG01C	C	5.2.9	Train A Component Cooling Water Pump
11EGG05CD	3301	EGHV0053	C	5.2.9	CCW Supply to Nuc Aux Comp
11EJB01AA	3301	PEJ01A	P	5.2.10	Train A RHR Pump
11EJB01AB	3301	PEJ01A	C	5.2.10	Train A RHR Pump
11EJG08AB	3301	EJFCV0610	C	5.2.10	Train A RHR Pump Miniflow Valve
11EJG08AC	3301	EJFCV0610	C	5.2.10	Train A RHR Pump Miniflow Valve
11EJG08AD	3301	EJFCV0610	C	5.2.10	Train A RHR Pump Miniflow Valve
11EJG08AE	3301	EJFCV0610	P	5.2.10	Train A RHR Pump Miniflow Valve
11EMB01AB	3301	PEM01A	C	5.2.11	Train A Safety Injection Pump
11ENB01AB	3301	PEN01A	C	5.2.12	Train A Containment Spray Pump
11GDY01AB	3301	CGD01A	C	5.2.7	Train A ESW Pump Room Supply Fan
11GFG01AC	3301	SGF02A	C	5.2.13	Train A Auxiliary Feedwater Pump Room Cooler
11GKG02AA	3301	SGK04A	P	5.2.14	Train A Control Room A/C Unit
11GKG13AA	3301	SGK05A	P	5.2.15	Train A Class 1E Electrical Equipment A/C Unit

Table C-9-4
PFSSD Cables Located in Fire Area C-9

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GKG13AG	3301	SGK05A	C	5.2.15	Train A Class 1E Electrical Equipment A/C Unit
11GKG13AH	3301	SGK05A	C	5.2.15	Train A Class 1E Electrical Equipment A/C Unit
11GKY02AA	3301	GKHZ0029A/B	C	5.2.14	Train A Control Room A/C Unit Supply and Return Dampers
11GKY02AB	3301	GKHZ0029A/B	C	5.2.14	Train A Control Room A/C Unit Supply and Return Dampers
11GKY02AC	3301	GKHZ0029A/B	C	5.2.14	Train A Control Room A/C Unit Supply and Return Dampers
11GKY02AD	3301	GKHZ0029A/B	C	5.2.14	Train A Control Room A/C Unit Supply and Return Dampers
11GKY02AE	3301	GKHZ0029A/B	P	5.2.14	Train A Control Room A/C Unit Supply and Return Dampers
11GKY02AF	3301	GKHZ0029A/B	P	5.2.14	Train A Control Room A/C Unit Supply and Return Dampers
11GLG05AA	3301	SGL10A	P	5.2.10	Train A RHR Pump Room Cooler
11GLG05AD	3301	SGL10A	C	5.2.10	Train A RHR Pump Room Cooler
11GLG05GA	3301	SGL12A	P	5.2.10	Train A CCP Pump Room Cooler
11GLG05GD	3301	SGL12A	C	5.2.10	Train A CCP Pump Room Cooler
11GLG06AD	3301	SGL11A	C	5.2.9	Train A CCW Pump Room Cooler
11GLY27AA	3301	GLHZ0080/GLHZ0081	P	5.2.9	Train A CCW Pump Room Cooler Exhaust Dampers
11GLY27AB	3301	GLHZ0080/GLHZ0081	C	5.2.9	Train A CCW Pump Room Cooler Exhaust Dampers
11GLY27AC	3301	GLHZ0080/GLHZ0081	P	5.2.9	Train A CCW Pump Room Cooler Exhaust Dampers
11GLY27AD	3301	GLHZ0080/GLHZ0081	C	5.2.9	Train A CCW Pump Room Cooler Exhaust Dampers

Table C-9-4
PFSSD Cables Located in Fire Area C-9

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GMG01AH	3301	DCGM01A	P	5.1.6	Train A Diesel Generator Room Supply Fan
11KJK01AA	3301	KJ121	P	5.2.16	Train A Diesel Generator Control Panel
11NBB01AB	3301	NBHS0010	C	5.1.2	NB01 Synchro-scope/Selector Switch
11NBB01AD	3301	NBHS0010	C	5.1.2	NB01 Synchro-scope/Selector Switch
11NBB01AE	3301	NBHS0010	C	5.1.2	NB01 Synchro-scope/Selector Switch
11NBB02AC	3301	NB0109	C	5.1.2	Bus NB01 Monitoring and Control
11NBB03BC	3301	NB0112	C	5.1.2	Bus NB01 Monitoring and Control
11NBB12AA	3301	NB0112	C	5.1.2	Bus NB01 Feeder Breaker NB0112 Control
11NBB12AB	3301	NB0112	C	5.1.2	Bus NB01 Feeder Breaker NB0112 Control
11NBB12AC	3301	NB0112	C	5.1.2	Bus NB01 Feeder Breaker NB0112 Control
11NBB12AD	3301	NB0112	C	5.1.2	Bus NB01 Feeder Breaker NB0112 Control
11NBB12AE	3301	NB0112	C	5.1.2	Bus NB01 Feeder Breaker NB0112 Control
11NBB12AF	3301	NB0112	C	5.1.2	Bus NB01 Feeder Breaker NB0112 Control
11NBB12AG	3301	NB0112	C	5.1.2	Bus NB01 Feeder Breaker NB0112 Control
11NBB13AA	3301	NB0109	C	5.1.2	Bus NB01 Feeder Breaker NB0109 Control
11NBB13AC	3301	NB0109	C	5.1.2	Bus NB01 Feeder Breaker NB0109 Control
11NBK13AA	3301	NB0109	P	5.1.2	Bus NB01 Feeder Breaker NB0109 Control
11NBK13AB	3301	NB0109	P	5.1.2	Bus NB01 Feeder Breaker NB0109 Control
11NEB01AA	3301	NE001	P	5.2.16	Train A Diesel Generator
11NEB01AC	3301	NE001	P	5.2.16	Train A Diesel Generator
11NEB01AE	3301	NE001	P	5.2.16	Train A Diesel Generator
11NEB01AK	3301	NE001	C	5.2.16	Train A Diesel Generator
11NEB01AL	3301	NE001	P	5.2.16	Train A Diesel Generator

Table C-9-4
PFSSD Cables Located in Fire Area C-9

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11NEB01AV	3301	NE001	P	5.2.16	Train A Diesel Generator
11NEB10AA	3301	NB0111	C	5.2.16	Train A D/G Feeder Breaker NB0111 Control
11NEB10AB	3301	NB0111	C	5.2.16	Train A D/G Feeder Breaker NB0111 Control
11NEB10AC	3301	NB0111	C	5.2.16	Train A D/G Feeder Breaker NB0111 Control
11NEB10AD	3301	NB0111	C	5.2.16	Train A D/G Feeder Breaker NB0111 Control
11NEB10AG	3301	NB0111	C	5.2.16	Train A D/G Feeder Breaker NB0111 Control
11NEB10AJ	3301	NB0111	C	5.2.16	Train A D/G Feeder Breaker NB0111 Control
11NEK12AA	3301	NE0107	P	5.2.16	Train A D/G Exciter Control Power
11NFK01CA	3301	NF039A	C	5.2.17	Load Shedder / Emergency Load Sequencer
11NFK01DA	3301	NF039B	C	5.2.17	Load Shedder / Emergency Load Sequencer
11NFY01EA	3301	NF039A	C	5.2.17	Load Shedder / Emergency Load Sequencer
11NFY01FA	3301	NF039B	C	5.2.17	Load Shedder / Emergency Load Sequencer
11NGB10AA	3301	NB0113	C	5.1.2	Bus NG01 Feeder Breaker
11NGB10AB	3301	NB0113	C	5.1.2	Bus NG01 Feeder Breaker
11NGB10BA	3301	NB0110	C	5.1.2	Bus NG03 Feeder Breaker
11NGB10BB	3301	NB0110	C	5.1.2	Bus NG03 Feeder Breaker
11NGB10SA	3301	NB0116	C	5.1.2	Bus NG05 Feeder Breaker
11NGB10SB	3301	NB0116	C	5.1.2	Bus NG05 Feeder Breaker
11NGG01AA	3301	XNG01	P	5.1.4	XNG01 Incoming Power Feed from NB0113
11NGG01AB	3301	NG01A	P	5.1.5	NG01A Incoming Power Feed from NG0106
11NGG01AC	3301	NG01A	P	5.1.5	NG01A Incoming Power Feed from NG0106
11NGG01AD	3301	NG01B	P	5.1.4	NG01B Incoming Power Feed from NG0107
11NGG01AE	3301	NG01B	P	5.1.4	NG01B Incoming Power Feed from NG0107

Table C-9-4
PFSSD Cables Located in Fire Area C-9

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11NGG01AJ	3301	NG01T	P	5.1.4	NG01T Incoming Power Feed from NG0108
11NGG01BA	3301	XNG03	P	5.1.6	XNG03 Incoming Power Feed from NB0110
11NGG01BB	3301	NG03C	P	5.1.6	NG03C Incoming Power Feed from NG0306
11NGG01BC	3301	NG03C	P	5.1.6	NG03C Incoming Power Feed from NG0306
11NGG01BD	3301	NG03D	P	5.1.6	NG03D Incoming Power Feed from NG0307
11NGG01BE	3301	NG03D	P	5.1.6	NG03D Incoming Power Feed from NG0307
11NGG01BF	3301	NG03T	P	5.1.6	NG03T Incoming Power Feed from NG0305
11NGG01SA	3301	XNG05	P	5.1.2	XNG05 Incoming Power from NB0116
11NGG11AA	3301	NG0101	C	5.1.4	Bus NG01 Feeder Breaker Control
11NGG11AC	3301	NG0101	C	5.1.4	Bus NG01 Feeder Breaker Control
11NGG11BA	3301	NG0301	C	5.1.6	Bus NG03 Feeder Breaker Control
11NGG11BC	3301	NG0301	C	5.1.6	Bus NG03 Feeder Breaker Control
11NGK11AA	3301	NG01	P	5.1.4	Bus NG01 125 VDC Breaker Control Power
11NGK11AB	3301	NG01	P	5.1.4	Bus NG01 125 VDC Breaker Control Power
11NGK11BA	3301	NG03	P	5.1.6	Bus NG03 125 VDC Breaker Control Power
11NGK11BB	3301	NG03	P	5.1.6	Bus NG03 125 VDC Breaker Control Power
11NKG10AA	3301	NK21	P	5.1.7	480 VAC Power to Battery Charger NK21
11NKG10CA	3301	NK23	P	5.1.7	480 VAC Power to Battery Charger NK23
11NKG10EA	3301	NK25	P	5.1.7	480 VAC Power to Battery Charger NK25
11NKG10EB	3301	NK25	P	5.1.7	480 VAC Power to Battery Charger NK25
11NKK01A1	3301	NK25	P	5.1.7	+ 125 VDC from NK75 to NK71
11NKK01A2	3301	NK25	P	5.1.7	- 125 VDC from NK75 to NK71
11NKK01A3	3301	NK25	P	5.1.7	+ 125 VDC from NK25 to NK75

Table C-9-4
PFSSD Cables Located in Fire Area C-9

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11NKK01A4	3301	NK25	P	5.1.7	- 125 VDC from NK25 to NK75
11NKK10EB	3301	NK25	P	5.1.7	NG0109 Breaker Control Power for NK25
11NKY12AA	3301	NK25	C	5.1.7	Swing Charger Transfer Switch Control
11NKY12AD	3301	NK25	C	5.1.7	Swing Charger Transfer Switch Control
11NKY12AE	3301	NK25	P	5.1.7	Swing Charger Transfer Switch Control
11NKY12CA	3301	NK25	P	5.1.7	Swing Charger Transfer Switch Control
11NKY12CB	3301	NK25	P	5.1.7	Swing Charger Transfer Switch Control
11NNG01AA	3301	NN11	P	5.2.18	480 VAC Power to Inverter NN11
11NNG01BA	3301	NN15	P	5.2.18	480 VAC Power to Swing Inverter NN15
11NNG01CA	3301	NN13	P	5.2.18	480 VAC Power to Inverter NN13
11NNK01JA	3301	NN15	P	5.2.18	125 VDC Power to Swing Inverter NN15
11NNK01JB	3301	NN15	P	5.2.18	125 VDC Power to Swing Inverter NN15
11NNK01JC	3301	NN15	P	5.2.18	125 VDC Power to Swing Inverter NN15
11NNK01JD	3301	NN15	P	5.2.18	125 VDC Power to Swing Inverter NN15
11NNY01EA	3301	NN11	P	5.2.18	120 VAC Power from NN15 to NN11
11NNY01EB	3301	NN11	P	5.2.18	120 VAC Power from NN15 to NN11
11PKK10AA	3301	PK21	C	5.1.4	NG0102 Breaker Control
11PKK10AB	3301	PK21	C	5.1.4	NG0102 Breaker Control
11PNG01AD	3301	PN07	P	5.2.19	Non-Class 1E Electrical Equipment AC Distribution Panel
11PNG01AE	3301	PN07	P	5.2.19	Non-Class 1E Electrical Equipment AC Distribution Panel
11RPK09AA	3301	RP139	P	5.1.8	125 VDC Feed to RP139

Table C-9-4
PFSSD Cables Located in Fire Area C-9

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11RPY09BA	3301	RP139	P	5.1.8	120 VAC Feed to RP139
11RPY10BA	3301	CGD01A	P	5.2.7	120 VAC Feed to RP068
12FCK23AX	3301	FCHV0312 FCFV0312	C	5.2.20	TDAFP Trip and Throttle Valve TDAFP Speed Governing Valve
12NFK01CA	3301	NF039A	C	5.2.17	Load Shedder / Emergency Load Sequencer
12NFY01EA	3301	NF039A	C	5.2.17	Load Shedder / Emergency Load Sequencer
13NFK01CA	3301	NF039A	C	5.2.17	Load Shedder / Emergency Load Sequencer
13NFK01DA	3301	NF039B	C	5.2.17	Load Shedder / Emergency Load Sequencer
13NFY01GA	3301	NF039A	C	5.2.17	Load Shedder / Emergency Load Sequencer
13NFY01HA	3301	NF039B	C	5.2.17	Load Shedder / Emergency Load Sequencer
13NKK01BY	3301	NK25	P	5.1.7	+ 125 VDC from NK75 to NK73
13NKK01BZ	3301	NK25	P	5.1.7	- 125 VDC from NK75 to NK73
13NNK01KA	3301	NN15	P	5.2.18	125 VDC Power to Swing Inverter NN15
13NNK01KB	3301	NN15	P	5.2.18	125 VDC Power to Swing Inverter NN15
13NNY01FA	3301	NN13	P	5.2.18	120 VAC Power from NN15 to NN13
13NNY01FB	3301	NN13	P	5.2.18	120 VAC Power from NN15 to NN13
14NFK01CA	3301	NF039A	C	5.2.17	Load Shedder / Emergency Load Sequencer
14NFY01EA	3301	NF039A	C	5.2.17	Load Shedder / Emergency Load Sequencer
15FCY35AA	3301	FC169A	P	5.1.9	SGFP A Controller Termination Cabinet
15NBA10AA	3301	XNB01	C	5.2.21	Train A ESF Transformer
15NBA10AD	3301	XNB01	C	5.2.21	Train A ESF Transformer
15NBB03AA	3301	NB01	P	5.1.2	Phase A Power Feed XNB01 to NB01
15NBB03AC	3301	NB01	P	5.1.2	Phase B Power Feed XNB01 to NB01

Table C-9-4
PFSSD Cables Located in Fire Area C-9

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15NBB03AE	3301	NB01	P	5.1.2	Phase C Power Feed XNB01 to NB01
15NBB03AJ	3301	NB01	P	5.1.2	XNB01 Differential Relay
15PKG10AA	3301	PK21	P	5.1.4	480 VAC Power to Non-Class 1E Battery Charger PK21 from NG0102
15RPY10AA	3301	PN09	P	5.1.9	Non-Class 1E 120 VAC Inverter
15RPY10AB	3301	PN09A	P	5.1.9	Non-Class 1E 120 VAC Distribution Panel
16NBA11AE	3301	PA0201	C	5.2.22	NB02 Feeder Breaker
16NBB05AL	3301	NB02	P	5.2.22	XNB02 Differential Relay

5.2.1 Auxiliary Feedwater Pump A (PAL01A)

Power and control cables associated with Train A auxiliary feedwater pump are run through area C-9. Damage to these cables could prevent operation of the pump. Redundant Train B auxiliary feedwater pump cables are run in a separate fire area and are unaffected by a fire. Therefore, PFSSD is assured using Train B auxiliary feedwater pump if a fire occurs in area C-9.

References: XX-E-013, E-15000

5.2.2 Centrifugal Charging Pumps

At least one centrifugal charging pump (CCP) is required for PFSSD to provide RCP seal cooling, reactivity control and inventory control. These functions are accomplished using a CCP taking suction from the refuelling water storage tank (RWST) and injecting through the RCP seals. RCP seal injection provides approximately 20 gpm makeup to the RCS and provides adequate boron concentration to maintain sub-critical reactivity conditions. If RCP seal injection is unavailable, reactivity and inventory control is provided by lining up the CCPs to the boron injection tank (BIT). The normal charging pump (NCP) is not credited and is assumed lost.

Power and control cables associated with Train A Centrifugal Charging Pump (CCP) are run through area C-9. Damage to these cables could prevent operation of the pump. Redundant Train B CCP cables are run in a separate fire area and are unaffected by a fire. Therefore, PFSSD is assured using Train B CCP if a fire occurs in area C-9.

Power and control cables associated with Train A charging pump miniflow valve BGHV8110 are run through area C-9. Redundant Train B cables for miniflow valve BGHV8111 are run in a different area and are unaffected by a fire in area C-9. Therefore, PFSSD is assured using Train B CCP miniflow valve if a fire occurs in area C-9.

Power and control cables associated with Train A CCP room cooler SGL12A are run in area C-9. Damage to these cables will prevent operation of the room cooler. Train B CCP room cooler SGL12B circuits do not run in area C-9 and are unaffected by a fire. Therefore, Train B CCP room cooler will be available.

Based on the above discussion, the Train A CCP could be affected but the Train B CCP is available if a fire occurs in area C-9.

References: XX-E-013, E-15000, E-13BG01, E-13BG11B, E-13GL05, E-13NB01

5.2.3 Volume Control Tank (VCT) Isolation Valve (BGLCV0112B)

Power and control cables associated with VCT valve BGLCV0112B run through fire area C-9. Cables for redundant VCT valve BGLCV0112C are run in a separate fire area and are unaffected by a fire in area C-9. The PFSSD position of these valves is at least one closed. Therefore, PFSSD can be accomplished by isolation of BGLCV0112C.

Cable damage due to a fire could bypass the BNLCV0112D interlock and cause inadvernent closure of BGLCV0112B. If this occurs prior to establishing suction from the RWST, damage to the operating charging pump could occur due to loss of suction. Calculation XX-E-013, assumption 3-A-22, states that systems and components are in their normal operating position or status prior to the fire. The Normal Charging Pump (NCP) is the normally operated pump and is assumed to be operating at the time of the fire. Inadvertent closure of valve BGLCV0112B with no suction from the RWST would result in damage to the NCP but the

centrifugal charging pumps would remain unaffected. As stated in 5.2.2, the A Train CCP could be unavailable but the B Train CCP is unaffected by the fire.

Based on the above discussion, the ability to achieve and maintain PFSSD is unaffected by a fire in area C-9 which affects VCT valve BGLCV0112B. Therefore, the configuration is acceptable.

References: XX-E-013, E-15000, E-13BG12, E-13BN01

5.2.4 Reactor Coolant Pump Seal Injection

PFSSD requires RCP seal injection to provide a boron injection path, provide makeup to the RCS and provide cooling to the RCP seals. The redundant boron injection and makeup path is through the boron injection tank (BIT). The redundant seal cooling method uses thermal barrrier cooling.

Power and control cables associated with Train A RCP seal injection flow throttling valve BGHV8357A are run in area C-9. Damage to these cables will prevent operation of the valve from the control room. Cables associated with redundant Train B valve BGHV8357B are run in a separate fire area and are unaffected by a fire in area C-9.

Based on the above discussion, PFSSD is assured using Train B charging pump and aligning RCP seal injection flow through BGHV8357B.

References: XX-E-013, E-15000, E-13BG52, M-12BG03

5.2.5 RWST To Charging Pump A Isolation Valve (BNLCV0112D)

Power and control cables associated with normally closed valve BNLCV0112D are run in area C-9. Damage to these cables will prevent operation of the valve from the control room. PFSSD requires suction from the RWST to the operating charging pump. Cables associated with redundant Train B valve BNLCV0112E are run in a separate fire area and are unaffected by a fire in area C-9.

Based on the above, PFSSD is assured using Train B charging pump and aligning suction through BNLCV0112E. Therefore, the configuration is acceptable.

References: XX-E-013, E-15000, E-13BN01

5.2.6 RWST To RHR Pump A Isolation Valve (BNHV8812A)

Power and control cables associated with normally open valve BNHV8812A are run in area C-9. Damage to these cables will prevent operation of the valve from the control room. This by itself does not cause a concern for PFSSD. However, if this valve were to remain open while EJHV8811A spuriously opened, the RWST would drain to the containment sump. Cables associated with valve EJHV8811A do not run in area C-9, so the valve cannot spuriously open. Therefore, draindown of the RWST to the containment sump is prevented in the event of a fire in area C-9.

References: XX-E-013, E-15000, E-13BN03

5.2.7 Essential Service Water Pumps and Associated Components

Either the Train A or the Train B essential service water (ESW) system is required to be available to ensure PFSSD. The ESW system supplies water to the following PFSSD components on the associated train:

- CCP room cooler
- RHR pump room cooler
- Class 1E switchgear room A/C condenser
- diesel generator engine cooling
- control room A/C condenser
- auxiliary feedwater pump room cooler
- motor and turbine driven auxiliary feedwater pump suction (backup to CST)
- containment air coolers
- electrical penetration room cooler
- component cooling water pump room cooler
- component cooling water heat exchanger
- component cooling water system makeup

Power and control cables associated with ESW pump A are run in area C-9. Damage to these cables will prevent the pump from operating. Cables associated with redundant Train B ESW pump PEF01B are run in a separate fire area and are unaffected by a fire in area C-9.

Cable 11EFG02SD is a control cable that provides an automatic start signal to the Train A ESW traveling water screen when the Train A ESW pump runs. An intra-cable short between the two conductors in this cable will start the screen in the absence of a running pump. If this occurs, operators can stop the screen using EFHIS0003 in the control room. An open in this cable will prevent the automatic start of the screen but operators can start it using EFHIS0003 in the control room. A short to ground would blow the CPT secondary side fuse and drop power to the control circuit, preventing the screen from operating. As stated in the previous paragraph, Train A ESW pump may not be available due to a fire in area C-9 but Train B ESW pump is available. Circuits for Train B traveling water screen do not run through area C-9.

Cable 11EFG03SD is a control cable associated with ESW Train A screen wash water valve EFHV0091. Damage to this cable could prevent operation of the valve. As stated above, Train A ESW pump may not be available due to a fire in area C-9 but Train B ESW pump is available. Circuits for Train B screen wash water valve EFHV0092 do not run through area C-9.

Cables 11EFG06SD and 11EFG06SE are associated with Train A ESW pump air release valve EFHV0097. Cable 11EFY10CA is a control cable associated with the air release valve time delay relay. The air release valve purges air from the pump casing upon pump start to encure pump operability. The time delay relay closes the air release valve after 15 seconds of ESW pump operation. Circuits for Train B ESW pump air release valve EFHV0098 do not run through area C-9 and are unaffected by the fire.

Cable 11EFK01SB is a control cable associated with the local start and stop switch for Train A ESW pump motor DPEF01A. Cable damage due to a fire could bypass local hand switch EFHIS0055B, located on control panel EF155, and spuriously start the Train A ESW pump. This would not adversely impact PFSSD due to the continued availability of the Train B ESW pump.

Cable 11GDY01AB is associated with the automatic start on the Train A ESW pump room supply fan control circuit. Upon start of the Train A ESW pump, the contacts on this circuit close and energize the ARC relay, which closes a contact to start the supply fan. A bistable

element will prevent the fan from starting if the room temperature is below a pre-determined set point. Cable damage due to a fire could spuriously start the fan or prevent it from starting. In either case, PFSSD is assured using the Train B ESW pump room supply fan, which is unaffected by a fire in area C-9.

Cable 11RPY10BA supplies 120 VAC control power to the automatic and manual start circuits for the Train A ESW pump room supply fan CGD01A. The control power is supplied via this cable to control room panel RP068 and is distributed to a number of fuse blocks including 1FU3, which provides circuit protection for CGD01A control power. If power is lost to the control circuit due to damage to this cable, then the Train A ESW pump room supply fan will not start either automatically, when the ESW pump starts, or manually from the control room. If this occurs, the Train B ESW pump room supply fan remains unaffected by the fire.

Based on the above discussion, Train A ESW may be affected by a fire in area C-9. PFSSD is assured for a fire in area C-9 using Train B ESW pump PEF01B and associated components.

References: XX-E-013, E-15000, E-13RP10, E-K3EF01, E-K3EF02, E-K3EF03, E-K3GD01, J-201-00137, J-201-00139

5.2.8 Essential Service Water To Service Water and UHS Isolation Valves

The Essential Service Water (ESW) system supplies water to various PFSSD components on the associated train. In order to ensure proper flow of ESW to the supplied loads, valves in the system need to be in the proper lineup.

Valve EFHV0023 is a normally open isolation valve on the service water system feed to the Train A Essential Service Water System. Either this valve or valve EFHV0025 is required to be closed when operating the Train A ESW system for PFSSD. Power and control cables associated with EFHV0023 are run in this area. Damage to these cables could prevent closing EFHV0023 from the control room. Redundant valve EFHV0025 is unaffected by a fire in area C-9 and can be closed from the control room to isolate this flowpath. In addition, check valve EFV0470 is installed in this line and will prevent flow diversion in the unlikely event valve EFHV0025 cannot be closed.

Valve EFHV0024 is a normally open isolation valve on the service water system feed to the Train B Essential Service Water System. Either this valve or valve EFHV0026 is required to be closed when operating the Train B ESW system for PFSSD. Power and control cables associated with EFHV0024 are run in this area. Damage to these cables could prevent closing EFHV0024 from the control room. Redundant valve EFHV0026 is unaffected by a fire in area C-9 and can be closed from the control room to isolate this flowpath. In addition, check valve EFV0471 is installed in this line and will prevent flow diversion in the unlikely event valve EFHV0026 cannot be closed.

Valve EFHV0041 is a normally open isolation valve on the return line from the Train A Essential Service Water System to the service water system. Either this valve or valve EFHV0039 is required to be closed when operating the Train A ESW system for PFSSD. Power and control cables associated with EFHV0041 are run in this area. Damage to these cables could prevent closing EFHV0041 from the control room. Redundant valve EFHV0039 is unaffected by a fire in area C-9 and can be closed from the control room to isolate this flowpath.

Valve EFHV0042 is a normally open isolation valve on the return line from the Train B Essential Service Water System to the service water system. Either this valve or valve EFHV0040 is required to be closed when operating the Train B ESW system for PFSSD. Power and control cables associated with EFHV0042 are run in this area. Damage to these cables could prevent closing EFHV0042 from the control room. Redundant valve EFHV0040 is

unaffected by a fire in area C-9 and can be closed from the control room to isolate this flowpath.

Valve EFHV0037 is the Train A return isolation valve from ESW to the Ultimate Heat Sink. This valve is required to be open when operating the Train A ESW system for PFSSD. Power and control cables associated with this valve is run in this area and damage could cause the valve to spuriously close. Circuits for redundant Train B valve EFHV0038 are not run in area C-21 and will be unaffected by the fire.

Based on the above discussion, several Train A valves associated with the ESW system could be affected by a fire in this area but redundant Train B valves are unaffected.

References: XX-E-013, E-15000, E-13EF02, E-13EF02A, E-13EF03, E-1F9402A, E-1F9402B, E-1F9403

5.2.9 Component Cooling Water (CCW)

For PFSSD, the component cooling water (CCW) system is used to provide cooling to the centrifugal charging pump (CCP) oil cooler, seal water heat exchanger, RHR heat exchangers and RHR pump seal coolers. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Power and control cables associated with Train A CCW pump motors DPEG01A and DPEG01C are run through area C-9. Damage to these cables could prevent operation of either pump or could cause the spurious operation of either or both pumps. Power to these pumps are supplied by 4.16 kV bus NB01. As stated earlier, bus NB01 can be completely de-energized if a fire occurs in area C-9. Therefore, spurious operation of the pumps can be mitigated.

Cable 11GLG06AD is associated with the automatic start circuit for the Train A CCW pump room cooler SGL11A. With hand switch GLHIS0002 in AUTO position, operation of either Train A CCW pump will close a contact in this circuit and start the room cooler. Damage to this cable due to a fire will either spuriously start the room cooler, prevent it from starting or blow the CPT secondary side fuse and drop power to the control circuit. In either case, Train B CCW room cooler SGL11B is unaffected by a fire in area C-9.

Power and control cables associated with Train A CCW Pump Room cooler exhaust dampers GLHZ0080 and GLHZ0081 are run in area C-9. Damage to these cables could prevent operation of the dampers. There are no exhaust dampers associated with Train B CCW pump room cooler.

Cable 11EGG05CD, associated with Train A CCW valve EGHV0053, is run in this area. This cable supplies power to auxiliary relay 3XEG9 which provides permissives to open or close valves in the CCW supply to and from the Radwaste building. If Train A CCW is operating at the time of the fire, valve EGHV0053 will be open. Damage to cable 11EGG05CD could cause the control power fuse to blow and prevent closure of EGHV0053 when lining up Train B CCW. A loss of power to NB01, which is possible if a fire occurs in this area, could also prevent closure of valves EGHV0015 and EGHV0053. Operation of Train B CCW with valves EGHV0015 and EGHV0053 open could cause Train B CCW flow to divert to Train A CCW system. Per calculation M-EG-24, the system will continue to operate with no damage to the pumps if the valves in the opposite train are open.

Train B CCW pumps PEG01B and PEG01D are unaffected by a fire in area C-9 and will be used to provide essential cooling to supplied Train B PFSSD components. Therefore, PFSSD is assured using Train B CCW system if a fire occurs in area C-9.

References: XX-E-013, E-15000, E-13EG01A, E-13EG01B, E-13EG05B, E-13NB02, Calculation M-EG-24

5.2.10 Residual Heat Removal System

Power and control cables associated with Train A RHR pump motor DPEJ01A are run through area C-9. Damage to these cables could prevent operation or cause spurious operation of the pump. Power to this pump is supplied by 4.16 kV bus NB01. As stated earlier, bus NB01 can be completely de-energized if a fire occurs in area C-9. Therefore, spurious operation of the pump can be mitigated. Power and control cables associated with Train B RHR pump motor DPEJ01B are not run through area C-9 and will be unaffected by the fire.

Power and control cables associated with Train A RHR pump miniflow valve EJFCV0610 are run in area C-9. Damage to these cables could prevent operation of the valve and cause damage to the Train A RHR pump, if it is operating. Train B RHR miniflow valve EJFCV0611 is unaffected by a fire in area C-9.

Power and control cables associated with Train A RHR pump room cooler SGL10A are run in area C-9. Damage to these cables will prevent operation of the room cooler. Train B RHR room cooler SGL10B circuits do not run in area C-9 and are unaffected by a fire. Therefore, Train B RHR room cooler will be available.

Train B RHR pump PEJ01B and associated components are unaffected by a fire in area C-9 and will be used to provide decay heat removal during cold shutdown. Therefore, PFSSD is assured using Train B RHR system if a fire occurs in area C-9.

References: XX-E-013, E-15000, E-13EJ01, E-13GL05, E-13NB01

5.2.11 Safety Injection (SI) Pumps

Spurious start of the SI pumps may complicate PFSSD due to the depletion of inventory in the RWST. Therefore, a spurious start of the SI pumps should be avoided or mitigated. A control cable associated with the Train A SI pump PEM01A runs through area C-9 and could cause the spurious start of the pump. The damage could prevent stopping the pump from the control room. The pump is powered from the 4.16 kV bus NB01. As stated earlier, the NB01 bus can be completely de-energized if a fire occurs in area C-9. Therefore, spurious operation of the pump can be mitigated.

References: XX-E-013, E-15000, E-13EM01, E-13NB01

5.2.12 Containment Spray (CS) Pumps

Spurious start of the CS pumps may complicate PFSSD due to the depletion of inventory in the RWST. Therefore, a spurious start of the CS pumps should be avoided or mitigated. A control cable associated with the Train A CS pump PEN01A runs through area C-9 and could cause the spurious start of the pump. The damage could prevent stopping the pump from the control room. The pump is powered from the 4.16 kV bus NB01. As stated earlier, the NB01 bus can be completely de-energized if a fire occurs in area C-9. Therefore, spurious operation of the pump can be mitigated.

References: XX-E-013, E-15000, E-13EN01, E-13NB01

5.2.13 Auxiliary Feedwater Pump (AFWP) Room Cooler

Cable 11GFG01AC is associated with the automatic start circuit on the Train A AFWP room cooler SGF02A. Upon start of the Train A AFWP, the contact associated with this circuit will close and the room cooler will start, as long as the hand switch is in the auto position. Damage to the cable due to a fire will either spuriously start the cooler or prevent it from automatically starting. In either case, the local hand switch (GFHIS0015) can be used to control the room cooler, provided a short to ground has not caused a loss of power to the control circuit.

Circuits associated with Train B AFWP room cooler SGF02B do not run through area C-9 and are unaffected by the fire. Therefore, PFSSD is assured using Train B Motor Driven AFWP to provide auxiliary feedwater to steam generators A and D if a fire occurs in area C-9.

References: XX-E-013, E-15000, E-13GF01

5.2.14 Control Room A/C Units

Cable 11GKG02AA is the SGK04A 480 VAC power cable from Load Center NG0105 to power and control panel GK198C. Damage to this cable due to a fire could prevent operation of Train A Control Room A/C unit SGK04A. Circuits for Train B Control Room A/C unit SGK04B do not run through area C-9 and are unaffected by a fire.

Power and control cables associated with Train A Control Room A/C unit supply and return dampers GKHZ0029A and GKHZ0029B are run in area C-9. Damage to these cables could prevent operation of the associated dampers. Circuits for Train B Control Room A/C unit dampers do not run in area C-9.

Based on the above discussion, Control Room environmental conditions will be unaffected by a fire in area C-9.

References: XX-E-013, E-15000, E-13GK02B, E-13GK02C

5.2.15 Class 1E Electrical Equipment Room A/C Unit

Power and control cables associated with Train A Class 1E Electrical Equipment room A/C unit SGK05A are run in area C-9. A fire could damage these circuits and prevent operation of the unit. Circuits for Train B Class 1E Electrical Equipment A/C unit SGK05B do not run in area C-9. Train B equipment is primarily used if a fire occurs in area C-9.

Based on the above discussion, Train B class 1E equipment room cooling is available and is unaffected by a fire in area C-9.

References: XX-E-013, E-15000, E-13GK13

5.2.16 Standby Diesel Generator Power Availability

Several cables associated with Train A diesel generator power and control are run in area C-9. Damage to these cables could prevent the Train A diesel generator from automatically or manually lining up to supply power to NB01. Train B diesel generator power and control circuits do not run in area C-9 and are unaffected by the fire.

Cable 11KJK01AA provides 125 VDC power to panel KJ121. Damage to this cable could prevent operation of the Train A diesel generator due to the loss of control power to the stop and control circuits. Cables associated with Train B diesel generator control panel KJ122 do not run in area C-9.

Based on the above discussion, the Train B diesel generator is unaffected by the fire and can be lined up to supply essential PFSSD equipment if a fire occurs in area C-9.

References: XX-E-013, E-15000, E-13KJ01A, E-13NE01, E-13NE10, E-13NE12

5.2.17 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus. This will, in turn, initiate an undervoltage condition and actuate the load shedder/sequencer and send a signal to start the associated diesel generator.

Cables associated with all four UV relays on NB01 and two of four UV relays on NB02 are run in area C-9. In addition, cables associated with all four PTs on NB01 and two of four PTs on NB02 are run in area C-9. Damage to these cables could provide a false undervoltage/degraded voltage condition on both safegaurds buses.

If both trains of diesel generators start and the load shedder/sequencer actuates, there will be no adverse impact on PFSSD. Therefore, a fire in area C-9 involving cables associated with the under voltage/degraded voltage signals will not adversely impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11NB01, E-11NB02, E-12NF01, E-13NF01, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, E-1F9402A, E-1F9402B, E-1F9403, E-1F9425, E-1F9426

5.2.18 Class 1E 120 VAC Electrical Distribution System

The Class 1E 120 VAC electrical distribution system provides power to vital instrumentation and control loads for shutdown and normal operation. Under normal conditions, the system is supplied by inverters connected to the 125 VDC NK battery system. Swing inverters allow the primary inverters to be taken out of service for maintainance or repair without disrupting power to the associated vital AC bus. In the event of a loss of power to the inverters, a backup source of power is automatically lined up. The backup power source originates from the 480 VAC electrical distribution system (NG).

Cable 11NNG01AA supplies 480 VAC power from NG0~~0~~1ACR3 to inverter NN11. Cable 11NNG01BA supplies 480 VAC power from NG01AGF4 to swing inverter NN15. Cable 11NNG01CA supplies 480 VAC power from NG01AGF3 to inverter NN13. Damage to these cables will disrupt the 480 VAC power source to Inverters NN11, NN13 and NN15.

Cables 11NNK01JA and 11NNK01JB supply 125 VDC power from NK0103 to manual transfer switch NK79. Cables 13NNK01KA and 13NNK01KB supply 125 VDC power from NK0303 to manual transfer switch NK79. Cables 11NNK01JC and 11NNK01JD supply 125 VDC power

from manual transfer switch NK79 to swing inverter NN15. Damage to these cables will disrupt the 125 VDC power supply to swing inverter NN15.

Cables 11NNY01EA and 11NNY01EB supply 120 VAC power from swing inverter NN15 to bus NN01 through a manual transfer switch in inverter NN11. Cables 13NNY01FA and 13NNY01FB supply 120 VAC power from swing inverter NN15 to bus NN03 through a manual transfer switch in inverter NN13. Damage to these cables will disrupt the 120 VAC power supply from swing inverter NN15 to the associated 120 VAC distribution panel.

Inverters NN11 and NN13 and 120 VAC vital distribution buses NN01 and NN03 are located in a separate fire area and are unaffected by a fire in area C-9. The 125 VDC power supply to inverters NN11 and NN13 is unaffected by a fire in area C-9. However, as stated in other sections of this evaluation (5.1.4, 5.1.6, 5.1.7), a fire in area C-9 could cause a loss of 480 VAC power to the Train A NK battery chargers (NK21, NK23 and NK25) which will cause a loss of normal power to the NK01 and NK03 125 VDC busses. Batteries NK11 and NK13 are unaffected and can supply 125 VDC to busses NK01 and NK03 to provide power to inverters NN11 and NN13 for a limited time.

Train B vital 120 VAC distribution panels NN02 and NN04 are unaffected by a fire in area C-9. Therefore, in the event of a loss of Train A Class 1E 120 VAC electrical distribution system, the Train B Class 1E electrical distribution switchboards are available to supply redundant PFSSD loads.

Based on the above discussion, damage to cables and components associated with Train A vital 120 VAC distribution panels NN01 and NN03 will not adversely impact the ability to achieve and maintain safe shutdown in the event of a fire in area C-9.

References: XX-E-013, E-15000, E-13NN01

5.2.19 Non-Class 1E 120 VAC Electrical Distribution System

The PFSSD function of the non-Class 1E 120 VAC electrical distribution system is to supply 120 VAC power to Main Control Boards RL017/RL018 and RL021/RL022. The power is split at each MCB to supply specific PFSSD components.

Cables 11PNG01AD and 11PNG01AE supply 480 VAC power from NG001BEF4 to 480/120V transformer XPN07A. Damage to either of these cables due to a fire in area C-9 will result in a loss of power to the transformer and loss of 120 VAC feed to PN07 from this power source. A redundant source of power to PN07 exists. The redundant power feed originates from PG19GFR3 (480 VAC) and supplies 480/120V transformer XPN07D. Transformer XPN07D supplies 120 VAC power to voltage regulator PN07A which then supplies the alternate source of power to PN07.

Cables associated with the alternate power feed to PN07, through transformer XPN07D, do not run in area C-9 and are unaffected by the fire. Therefore, panel PN07 remains available to supply its respective PFSSD loads. Both power feeds to non-class 1E 120 VAC panel PN08 are unaffected.

References: XX-E-013, E-15000, E-13PN01, E-13PN01A, E-1F9421

5.2.20 Turbine Driven Auxiliary Feedwater Pump Trip and Throttle Valve (FCHV0312)

The PFSSD design requires the use of one auxiliary feedwater pump supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

Cable 12FCK23AX is a control cable associated with valves FCHV0312 and FCHV0313. One conductor within this five conductor cable is used in the close circuit of valve FCHV0312 and the remaining four cables are used in the control circuit of valve FCFV0313. Damage to this cable could prevent operation of valves FCHV0312 and FCFV0313.

In the event valves FCHV0312 and FCFV0313 fail due to damage to this cable, the Train B Motor Driven Auxiliary Feedwater Pump is available to provide auxiliary feedwater to steam generators A and D.

References: XX-E-013, E-15000, E-13FC23, E-13FC24, E-1F9202, M-12FC02

5.2.21 Engineered Safety Features (ESF) Transformer XNB01

Cables 15NBA10AA and 15NBA10AD are associated with the automatic fault protection circuit for ESF transformer XNB01. Damage to these cables due to a fire in area C-9 could cause a spurious trip of switchyard breakers 13-8 and 13-48, which provide power to XNB01. Damage could also prevent automatic trip of the breakers in the event of a fault.

As discussed in Section 5.1.3, transformer XNB01 can be isolated using available hand switches in the control room. Loss of power to XNB01 will not adversely impact PFSSD since Train B diesel generator is available to supply bus NB02 and associated Train B PFSSD loads. Therefore, damage to these cables will not impact the ability to achieve and maintain safe shutdown in the event of a fire in area C-9.

References: XX-E-013, E-15000, E-13NB10

5.2.22 Train B Class 1E Equipment Bus NB02

Cable 16NBA11AE is associated with the fault protective circuit on XNB02 feeder breaker PA0201. Damage to this cable due to a fire could cause a loss of power to the fault and indication portions of the PA0201 control circuit, which would prevent tripping on fault conditions but would not prevent operation of the breaker from the control room. Damage could also cause a spurious fault condition which will trip breaker PA0201 and prevent operation of the breaker from the control room.

Cable 16NBB05AL is associated with the differential protective relay for XNB02. Damage to this cable due to a fire could cause a spurious differential current signal and trip XNB02 feeder breaker PA0201.

Loss of power to XNB02 due to damage to the cables listed above will not adversely impact PFSSD due to the availability of the Train B diesel generator to supply power to NB02. Therefore, PFSSD can be achieved using Train B Class 1E equipment powered by the Train B emergency diesel generator.

References: XX-E-013, E-15000, E-13NB05, E-13NB11

FIRE AREA C-10

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-10 is located on the 2000-0 elevation of the Control Building and includes the rooms listed in Table C-10-1.

Table C-10-1
Rooms Located in Fire Area C-10

ROOM #	DESCRIPTION
3302	Train B Engineered Safety Features Switchgear Room

Fire area C-10 is protected with an automatic Halon fire suppression system. In addition, automatic fire detection is installed throughout.

Fire Area C-10 primarily contains cables and equipment for Train B and non-safety related components. Redundant Train A cables and components are located in a separate fire area divided by 3-hour fire rated construction. The 3-hour fire rated barrier provides reasonable assurance that a fire in area C-10 will not affect Train A components and therefore the ability to achieve and maintain safe shutdown in the event of a fire in area C-10 is assured.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-10-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-10-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-10

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	All PFSSD functions associated with the main steam system are satisfied. Steam generator A ARV can be isolated from the control room. Steam generator C ARV can be controlled from the control room. Steam generator B ARV may need to be controlled using local controller ABFHC0002. Steam generator D ARV may need to be isolated by closing the air and nitrogen lines to the ARV.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
AE	Main Feedwater	H, P	All PFSSD functions associated with the main feadwater system are satisfied. Steam generator B wide range level transmitter AELT0502 and steam generator D wide range level transmitter AELT0504 may be affected. Wide range level transmitters on steam generators A and C are unaffected. Narrow range level transmitters on all four steam generators are unaffected.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. Train B motor driven auxiliary feedwater pump and the turbine driven auxiliary feedwater pump may not be available. Train A motor driven auxiliary feedwater pump is available to supply water to steam generators B and C.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
BB	Reactor Coolant System	R, M, H, P, S	All PFSSD functions associated with the reactor coolant system are satisfied. Pressurizer PORV Block Valve BBHV8000B may not close. However, PORV BBPCV0456A is unaffected by the fire and will prevent a loss of RCS inventory. RCS process monitoring instruments BBLT0460 (narrow range pressurizer level); BBPT0406 (RCS pressure); BBTE0423B (RCS loop 2 cold leg temperature); and BBTE0443A (RCS loop 4 hot leg temperature) may be affected. Redundant RCS process monitoring instruments are unaffected.
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. Components associated with Train B CVCS may be affected. Redundant Train A CVCS components are available. VCT isolation valve BGLCV0112C may not operate. VCT isolation valve BGLCV0112B is available. Seal injection using Train B flow throttling valve BGHV8357B may not be available. Train A flow throttling valve BGHV8357A is available.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.

Table C-10-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-10

System	System Name	PFSSD Function*	Comments
BN	Borated Refueling Water Storage System	R, M, H	All PFSSD functions associated with the Borated Refueling Water Storage system are satisfied. The Train B CCP suction isolation valve from the RWST (BNLCV0112E) may not open. Train A CCP suction isolation valve BNLCV0112D is available. The Train B RHR suction isolation valve from the RWST (BNHV8812B) may not open. Train A RHR suction isolation valve BNHV8812A is available.
EF	Essential Service Water System	H, S	All PFSSD functions associated with the Essential Service Water System are satisfied. Several Train B ESW components may be affected by a fire in this area. Train A ESW remains available.
EG	Component Cooling Water System	S	The PFSSD function associated with the Component Cooling Water System is satisfied. Train B CCW pumps PEG01B and PEG01D may be affected. Train A CCW system is available.
EJ	Residual Heat Removal System	M, H, P	All PFSSD functions associated with the Residual Heat Removal System are satisfied. Train B RHR pump and miniflow valve EJFCV0611 may be affected. Train A RHR system remains available.
EM	High Pressure Coolant Injection	R, M	Train B safety injection pump PEM01B could spuriously start. Injection will not occur with the reactor at normal pressure and SI flow would divert back to the RWST through valve EMHV8814B.
EN	Containment Spray	R, M	Train B containment spray pump PEN01B could spuriously start. A spurious containment spray actuation signal will not occur and valve ENHV0012 will remain closed to prevent flow. Damage to the CS pump could occur but PFSSD is still assured.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
FC	Auxiliary Turbines	R, H, P	The TDAFP trip and throttle valve (FCHV0312) and the speed governing valve (FCFV0313) may be affected. The Train A MDAFP is available. Valve FCFV0105 may be affected. The MSIVs can be closed using all-close hand switches ABHS0079 or ABHS0080.
GD	ESW Pump House HVAC	S	Train B ESW pump room ventilation may be affected. Train A ESW pump room ventilation is unaffected.
GF	AFW Pump Room Coolers	S	Train B Motor Driven AFW pump room cooler SGF02B may be affected. Train A MDAFP room cooler is unaffected.

Table C-10-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-10

System	System Name	PFSSD Function*	Comments
GK	Control Room and Class 1E Switchgear Room Coolers	S	Train B control room and Class 1E switchgear room coolers may be affected. Train A room coolers are unaffected.
GL	Auxiliary Building HVAC	S	The PFSSD function associated with the Auxiliary Building HVAC System is satisfied. The Train B RHR pump room cooler SGL10B, CCP pump room cooler SGL12B and CCW pump room cooler SGL11B may be affected. Train A room coolers are available.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function associated with the Emergency Diesel Generator Room HVAC System is satisfied. Diesel generator room B exhaust damper GMHZ0019 may be affected. Train A diesel generator room exhaust damper GMHZ0009 is unaffected. Train B EDG room ventilation could be affected. Train A EDG room ventilation is unaffected.
GN	Containment Coolers	S	The PFSSD function associated with the Containment Cooling System is satisfied. Train B containment coolers may not operate due to loss of Train B ESW. Train A containment coolers remain available.
JE	Diesel Fuel Oil	S	The PFSSD function associated with the Diesel Fuel Oil System is satisfied. The Train B emergency fuel oil transfer pump PJE01B may be affected. The Train A emergency fuel oil transfer pump PJE01A is unaffected.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
KJ	Standby Diesel Engine	S	The PFSSD function associated with the Standby Diesel Engine System is satisfied. The Train B diesel engine may be affected. The Train A diesel engine is unaffected.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
NB	4.16 kV System	S	Off-site power to NB01 and NB02 could be lost. The Train A EDG is available to energize the NB01 bus.
NE	Standby Diesel Generator	S	The Train B diesel generator may be affected. The Train A diesel generator is unaffected.

Table C-10-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-10

System	System Name	PFSSD Function*	Comments
NF	Load Shed and Emergency Load Sequencing	S	All four undervoltage (UV) relays on Train B may be affected. Two of the four UV relays on Train A may be affected. Emergency load shed/sequencer operates when 2/4 UV relays sense undervoltage on the bus. Therefore, Train A Load Shed and Emergency Load Sequencing will be available.
NG	480V Load Centers and MCCs	S	Train B 480 V load centers may be affected. Train A 480 V load centers are available.
NK	125VDC	S	Train B 125 VDC Swing Battery Charger NK26 is affected. Redundant Train A Swing Battery Charger NK25 is unaffected. Train B Swing Inverter NN16 DC power source selector switch NK80 may be affected. Train A Swing Inverter NN15 DC power source selector switch NK79 is unaffected.
NN	120VAC	S	The Train B 120 VAC distribution system may be affected. The Train A 120 VAC system is unaffected.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
PK	125VDC	S	Battery charger PK22 may be affected. Redundant charger PK21 is unaffected.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
PN	120VAC	S	One of the two redundant power feeds to PN08 could be affected. The remaining power feed is unaffected. Therefore, PN08 is available to perform its intended function.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
RP	Miscellaneous Control Panels	R, M, H, P, S	Relay rack RP140, BOP instrument rack RP147A/B and lockout relay racks RP334 and RP335 may be affected. Relay rack RP139 is unaffected. Damage to RP147A/B and RP334/335 will not affect PFSSD.

Table C-10-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-10

System	System Name	PFSSD Function*	Comments
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
SB	Reactor Protection System	R, S	Process monitoring fire isolation cabinets SB148A and SB148B may be affected. Damage to these cabinets will not affect PFSSD.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-10.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-10. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator Atmospheric Relief Valves

It may be necessary to control steam flow through ARV ABPV0002 by using local controller ABFHC0002. In addition, it may be necessary to fail close ARV ABPV0004 by isolating the air and nitrogen supplies using KAV1429 and KAV1365, respectively. Local controller ABFHC0002 as well as the air and nitrogen supply valves for ABPV0004 are located in fire area A-23 and access is available without having to traverse area C-10.

3.1.2 De-energize Bus NB02

If control power to breaker PA0201 is lost, operators may not be able to open the breaker from the control room. If this occurs, breaker PA0201 can be tripped using the manual trip push button located at the breaker. The operator performing this action will have to wear protective clothing per the Wolf Creek electrical safety manual.

Bus NB02 could remain energized if the emergency diesel generator NE02 starts and breaker NB0211 spuriously closes. If the fire is in C-10, access to the emergency diesel generator to locally stop it is unavailable. As discussed in Section 5.1.9, an energized NB02 bus will not adversely impact PFSSD.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 De-Energize Bus NB02

It may be necessary to de-energize XNB02 if alternate feeder breaker NB0212 spuriously closes. This can be done by placing 1HS-SY018 and 1HS-SY022 in pull-to-lock to open switchyard breakers 13-8 and 13-48, respectively. However, as stated in 3.1.2, the diesel generator could operate and maintain power on NB02.

3.2.2 Component Cooling Water

Train B CCW could be affected by a fire in this area. If this occurs, swap to Train A CCW using normal operating procedures if Train A CCW is not already running.

3.2.3 Reactor Coolant Pump Seal Cooling

If Train B CCW is operating at the time of the fire, it could be lost causing a temporary loss of thermal barrier cooling. The normal charging pump is not analyzed and is assumed lost. Operators should swap to Train A CCW to restore thermal barrier cooling and line up the Train A CCP to restore RCP seal injection.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

With some exceptions, redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-10.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-10

PFSSD components (S. in E-15000) located in fire area C-10 are shown in Table C-10-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table C-10-3.

Table C-10-3 PFSSD Equipment Located in Fire Area C-10				
Room #	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
3302	ALFY0005B	ALHV0005 I/E Converter	5.1.1	
3302	BBHS8000D	Pressurizer PORV Isolation Valve BBHV8000B Iso Switch	5.1.2	
3302	BGHS0112C	VCT Iso Valve From Charging Pump Suction Iso Switch	5.1.3	
3302	BGHS8111A	BGHV8111 Control Room Isolation Switch	5.1.12	
3302	BNHS0112E	BNLCV0112E Control Room Isolation Switch	5.1.12	
3302	BNHS8812B	RWST to RHR Pump B Suction Valve Iso Switch	5.1.4	
3302	EFHS0026A	ESW B to Service Water Cross Connect Vlv Iso Switch	5.2.8	
3302	EFHS0038A	ESW B To Ultimate Heat Sink Iso Vlv Iso Sw	5.2.8	
3302	PN10	Non-Class 1E 120 VAC Inverter	5.1.17	
3302	PN10A	Non-Class 1E 120 VAC Distribution Panel	5.1.17	
3302	GDHS0011	ESW Pump Room Supply Fan 1B Local Control HS	5.1.7	
3302	GDTSL0011	ESW Pump Room Supply Fan 1B Temp Switch Low	5.1.7	
3302	GMTSL0011	Train B Diesel Generator Room Supply Fan 1B Temp Switch Low	5.2.15	
3302	NB02	Train B Class 1E 4.16 kV ESF Switchgear Bus	5.1.8 5.1.9	See 5.1.8 for a list of breakers. See 5.1.9 for a list of switchgear mounted hand switches.
3302	NBHS0014	Train B CCP, ESW and CCW Isolation Handswitch	5.1.10	
3302	NG02	Train B 480 Volt Class 1E Load Center	5.1.11	See 5.1.11 for list of breakers.
3302	NG02A	Train B 480 Volt Class 1E Control Building MCC	5.1.12	See 5.1.12 for list of breakers.
3302	NG04	Train B 480 Volt Class 1E Load Center	5.1.13	See 5.1.13 for list of breakers.
3302	NGHIS0015	NG0201 Isolation Hand Switch	5.1.11	
3302	NGHIS0016	NG0401 Isolation Hand Switch	5.1.13	
3302	NK26	125 VDC Class 1E Swing Battery Charger	5.1.14	

Table C-10-3
PFSSD Equipment Located in Fire Area C-10

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
3302	NK76	Swing Battery Chgr NK26 DC Power Transfer Switch	5.1.14	
3302	NK78	Swing Battery Chgr NK26 AC Power Transfer Switch	5.1.14	
3302	NK80	Swing Inverter NN16 DC Power Transfer Switch	5.2.19	
3302	NKHS0026	Swing Battery Chgr NK26 AC Power Transfer Sw Hs	5.1.14	
3302	NKHS0411	Swing Battery Chgr NK26 Brkr Ctrl Handswitch	5.1.14	
3302	NN16	7.5 KVA Swing Inverter	5.2.19	
3302	PTNB201/B	NB02 Degraded Voltage Potential Transformer	5.2.1	
3302	PTNB210/B	NB02 Degraded Voltage Potential Transformer	5.2.1	
3302	PTNB216/B	NB02 Degraded Voltage Potential Transformer	5.2.1	
3302	PTNB217/B	NB02 Degraded Voltage Potential Transformer	5.2.1	
3302	RP140	Auxiliary Relay Rack	5.1.15	
3302	RP147A	BOP Instrumentation Rack	5.1.16	
3302	RP147B	BOP Instrumentation Rack	5.1.16	
3302	RP334	Lockout Relay Rack	5.1.6	
3302	RP335	Lockout Relay Rack	5.1.6	
3302	SB148A	Process Monitoring Fire Isolation Cabinet	5.1.5	
3302	SB148B	Process Monitoring Fire Isolation Cabinet	5.1.5	
3302	XNG02	Train B 480V Class 1E Load Center Xfmr - Ctrl Bldg	5.1.11	
3302	XNG04	Train B 480V Class 1E Load Center Xfmr - Ctrl Bldg	5.1.13	

5.1.1 MDAFP B to S/G D Control Valve (ALHV0005)

Valve ALHV0005 is a control valve installed on the discharge side of Motor Driven Auxiliary Feedwater Pump B and controls auxiliary feedwater flow to Steam Generator D. The valve is capable of throttling whenever the combined flow from the B MDAFP and the TDAFP exceeds 300 gpm. Control panel RP147B, which is located in fire area C-10, houses the controls for this feature. Instrumentation and control cables associated with the valve control logic are also run in area C-10. Controller ALFY0005B, located within RP147B, provides the signal to throttle ALHV0005, as required, to ensure flow to S/G D does not exceed 300 gpm.

A fire in area C-10 will damage a number of Train B components, including power and control cables for Train B MDAFP. The Train A MDAFP is unaffected by a fire in area C-10 and will be available to supply auxiliary feedwater to steam generators B and C. Valves ALHV0009 (MDAFP A to SG B) and ALHV0011 (MDAFP A to SG C) are unaffected by a fire in area C-10. Therefore, damage to components associated with ALHV0005 will not adversely impact post-fire safe shutdown.

References: XX-E-013, E-15000, E-13AL09, E-1F9204, J-110-00939

5.1.2 Pressurizer PORV Block Valve BBHV8000B

Hand switch BBHS8000D is an isolation switch used to isolate the control room circuits from the remaining valve control circuits. The switch allows manual closure of the valve at the Motor Control Center if the normal means of closing the valve from the control room are unavailable. The isolation switch is used in OFN RP-017 for a fire in the control room. Damage to this switch due to a fire could prevent operation of valve BBHV8000B from the control room. Valve BBHV8000B is required to be closed for PFSSD, or pressurizer PORV BBPCV0456A is required to be closed. Cables for pressurizer PORV BBPCV0456A do not run through area C-10 and are therefore unaffected by a fire in C-10.

Cables 14BBG39BF and 14BBG39BJ, associated with block valve BBHV8000B, are also run through area C-10 and may be damaged by a fire, preventing operation of the valve. This is acceptable for PFSSD as long as PORV BBPCV0456A is able to perform its intended function.

A fire in area C-10 could impact the ability to operate valve BBHV8000B. However, pressurizer PORV BBPCV0456A is unaffected by a fire in area C-10 and remains available to perform its intended function.

References: XX-E-013, E-15000, E-13BB39, E-13BB40, E-1F9301

5.1.3 VCT Isolation Valve BGLCV0112C

Hand switch BGHS0112C is used to isolate BGLCV0112C from the control room and allows manual closure of the valve at the MCC. The isolation switch is used in OFN RP-017 for a fire in the control room.

Cables 14BGG12BA, 14BGG12BB, 14BGG12BC, 14BGG12BD and 14BGG12BE are associated with BGLCV0112C and are run in area C-10.

Damage to BGHS0112C or the cables listed above could cause the spurious closure of BGLCV0112C or could prevent closing the valve from the control room. PFSSD requires either this valve or valve BGLCV0112B be closed after the RWST is lined up to provide a suction source to the operating charging pump.

Failure of the valve to close is mitigated by closing valve BGLCV0112B, which is unaffected by a fire in area C-10. If the valve spuriously closes prior to lining up the RWST, then damage to

the operating charging pump could occur due to loss of a suction source. Calculation XX-E-013, assumption 3-A-22, states that systems and components are in their normal operating position or status prior to the fire. The Normal Charging Pump (NCP) is the normally operated pump and is assumed to be operating at the time of the fire. Inadvertent closure of valve BGLCV0112C with no suction from the RWST would result in damage to the NCP but the centrifugal charging pumps would remain unaffected. The Train A CCP is unaffected by a fire in area C-10.

Based on the above discussion, the ability to achieve and maintain PFSSD is unaffected by a fire in area C-10 which affects VCT valve BGLCV0112C. Therefore, the configuration is acceptable.

References: XX-E-013, E-15000, E-13BG12A, E-13BN01

5.1.4 RWST to RHR Pump B Iso Valve (BNHV8812B)

Valve BNHV8812B is a normally open isolation valve from the RWST and supplies a suction source to the Train B RHR pump. Either this valve or valve EJHV8811B is required to be closed for PFSSD to prevent draindown of the RWST into the containment sump. Hand switch BNHS8812B is an isolation switch used to isolate this valve from the control room in the event of a control room fire. The hand switch is used in OFN RP-017 to manually close BNHV8812B from the MCC.

Cables 14BNG03BA, 14BNG03BB, 14BNG03BC and 14BNG03BJ are associated with BNHV8812B. Damage to these cables or the isolation switch due to a fire in area C-10 could prevent closure of valve BNHV8812B. Cables associated with EJHV8811B are not run in area C-10 and, therefore, valve EJHV8811B will remain closed to prevent draindown of the RWST into the containment sump. In addition, cables associated with all four RWST level transmitters are run outside of area C-10, so a spurious RWST low level signal initiating the automatic opening of EJHV8811B is not credible for a fire in area C-10.

Based on the above discussion, draindown of the RWST into the containment sump is prevented if a fire occurs in area C-10.

References: XX-E-013, E-15000, E-13BN03A, E-13BN07, E-13EJ06B

5.1.5 Process Monitoring Fire Isolation Cabinets SB148A and SB148B

The PFSSD function of cabinets SB148A and SB148B is to provide reliable process monitoring instrumentation at the remote shutdown panel in the event of a fire in the control room. This allows operators the ability to monitor critical process variables during shutdown from outside the control room. Those variables monitored at the remote shutdown panel, and whose instrumentation cables run to SB148A or SB148B, are as follows:

- Steam Generator B Water Level using AELI0502A (SB148A)
- Steam Generator D Water Level using AELI0504A (SB148B)
- Pressurizer Level using BBLI0460B (SB148A)
- RCS Cold Leg Loop 2 Temperature using BBTI0423X (SB148A)
- RCS Hot Leg Loop 4 Temperature using BBTI0443A (SB148A)
- RCS Pressure using BBPI0406X (SB148B)

A fire in area C-10 could cause a loss of control room process monitoring capability from the transmitters associated with the above listed indicators. Instrumentation cables associated with the transmitters run to cabinets SB148A or SB148B before the signals split and run to both the control room and the auxiliary shutdown panel. Therefore, a fire in area C-10 that

damages the cabinets or associated cables could prevent the control room from receiving signals from the following transmitters:

- AELT0502 – Steam Generator B Wide Range Water Level
- AELT0504 – Steam Generator D Wide Range Water Level
- BBLT0460 – Pressurizer Level Transmitter Narrow Range
- BBTE0423B – RCS Loop 2 Cold Leg Temperature Element
- BBTE0443A – RCS Loop 4 Hot Leg Temperature Element
- BBPT0406 – RCS Pressure Transmitter

In addition, power cables that provide 120 vac to cabinets SB148A and SB148B run through area C-10. Damage to these cables could disrupt power to the cabinets and prevent operation of the instruments.

Redundant means of monitoring the process variables listed above are available and are unaffected by a fire in area C-10. These redundant means are described below:

- AELT0527, AELT0528, AELT0529 and AELT0552 are available to provide level indication (narrow range) for steam generator B to associated indicators in the control room.
- AELT0547, AELT0548, AELT0549 and AELT0554 are available to provide level indication (narrow range) for steam generator D to associated indicators in the control room.
- BBLT0459 is available to provide pressurizer level (wide range) to level indicator BBLI0459A in the control room.
- BBTE0413B, BBTE0433B, and BBTE0443B are available to provide RCS Cold Leg temperature to associated indicators in the control room.
- BBTE0413A, BBTE0423A, and BBTE0433A are available to provide RCS Hot Leg temperature to associated indicators in the control room.
- BBPT0405 is available to provide RCS pressure to pressure indicator BBPI0405.

Based on the above discussion, a fire in area C-10 that affects the process monitoring instrumentation associated with cabinets SB148A and SB148B will not impact the ability to achieve and maintain PFSSD due to the availability of redundant process monitoring instrumentation in the control room.

References: XX-E-013, E-15000, E-13AE08, E-13BB15, E-13BB16, E-13SB09, E-13SB16, E-13NN01

5.1.6 Lockout Relay Panels RP334 and RP335

Relay panels RP334 and RP335 house the PFSSD relays identified in the following table.

Relay #	Description
Panel RP334 PFSSD Relays	
86XRP1	Turbine Driven AFWP Trip and Throttle Valve (FCHV0312)
86XRP2	Main Steam Supply Valve to TDAFP (ABHV0006)
86XRP3	Main Steam Supply Valve to TDAFP (ABHV0005)
86XRP9	Pressurizer Backup Group B Heaters
Panel RP335 PFSSD Relays	
86XRP5	Train B MDAFP from CST and ESW Supply Valves (ALHV0034 and ALHV0030)
86XRP6	ESW to TDAFP Supply Valve (ALHV0033)

Relay #	Description
86XRP7	Train B MDAFP (PAL01B)

The relays identified in the above table are used in OFN RP-017 to isolate the control room from the listed components in the event of a fire in the control room. The lockout relays (LOR) are actuated by operators placing hand switches RPHIS0001, RPHIS0002 and RPHIS0003 in isolate position.

Damage to the relays and/or associated cables due to a fire in area C-10 could prevent operation of the listed equipment. If this occurs, Train A equipment, located in a separate fire area, is available and is unaffected by the fire.

Cable 12RPK09BA provides Class 1E 125 VDC power from NK4201 to panel RP334. Damage to this cable could disrupt power to the TDAFP loads served by panel RP334, which could prevent operation of the TDAFP. Cable 14RPK09NA provides Class 1E 125 VDC power from NK4419 to panel RP335. Damage to this cable could disrupt power to the loads served by panel RP335, which could prevent operation of the associated equipment. The Train A MDAFP is available and is unaffected by the fire.

Based on the above discussion, a fire involving lockout relay panels RP334 and RP335 will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13AB01, E-13AB01A, E-13AL02B, E-13AL04B, E-13BB24, E-13FC23, E-13RP09, E-13RP11, E-13RP12, E-13RP14, E-13RP15, OFN RP-017

5.1.7 ESW Pump Room Ventilation

Hand switch GDHS0011 is an isolation switch used to isolate Train B ESW pump room supply fan control circuit from the control room and manually start the fan. The switch is used in OFN RP-017 when aligning Train B ESW in response to a fire in the control room.

Cables 14GDG01BE, 14GDG01BF, 14GDG01BH and 14GDY01BB, associated with the Train B ESW pump room supply fan, is run in area C-10. Damage to these cables, or the associated hand switches, could prevent operation of the supply fan.

Cable 14GDI04BF provides ESW B room temperature from temperature element GDTE0011 to temperature controller GDTC0011. Cable 14GDI04BG provides signals from GDTC0011 to outside air intake damper GDTZ0011A. Cable 14GDI04BH provides signals from GDTC0011 to recirculation damper GDTZ0011B. Damage to these cables could prevent operation of the dampers. Temperature controls for Train A ESW pump room are unaffected by a fire in area C-10.

Cable 14GDY01BB is associated with the automatic start on the Train B ESW pump room supply fan control circuit. Upon start of the Train B ESW pump, the contacts on this circuit close and energize the ARC relay, which closes a contact to start the supply fan. Cable 14GDY01BD is associated with low temperature switch GDTSL0011 that prevents the fan from starting if the room temperature is below a pre-determined set point. Damage to these cables due to a fire could spuriously start the fan or prevent it from starting. In either case, the Train A ESW pump room ventilation system is unaffected by a fire in area C-10.

Cable 14RPY10BA supplies 120 VAC control power to the automatic and manual start circuits for the Train B ESW pump room supply fan CGD01B. The control power is supplied via this cable to control room panel RP068 and is distributed to a number of fuse blocks including 4FU1, which provides circuit protection for CGD01B control power. If power is lost to the

control circuit due to damage to this cable, then the Train B ESW pump room supply fan will not start either automatically, when the ESW pump starts, or manually from the control room. If this occurs, the Train A ESW pump room supply fan remains unaffected by the fire.

Cables and components associated with Train A ESW pump room supply fan and dampers are not run in area C-10 and are therefore unaffected by the fire. Therefore, Train A ESW pump room supply fan is available to maintain the required environmental conditions while the Train A ESW pump is operating.

References: XX-E-013, E-15000, E-K3GD01A, E-K3GD04A

5.1.8 Train B Class 1E 4.16 kV ESF Switchgear Bus NB02

Bus NB02 supplies power to Train B Engineered Safety Features (ESF) components. A fire in area C-10 could damage NB02 and associated feeder breakers and disrupt power to all Train B ESF components. The following table identifies the NB02 PFSSD feeder breakers that could be lost in the event of a fire in area C-10.

Class 1E 4.16 kV ESF Switchgear Bus NB02	
Feeder Breaker	**Description**
NB0201	Centrifugal Charging Pump B
NB0202	Safety Injection Pump B
NB0203	Containment Spray Pump B
NB0204	RHR Pump B
NB0205	Auxiliary Feedwater Pump B
NB0206	Component Cooling Water Pump B
NB0207	Component Cooling Water Pump D
NB0208	Pressurizer Backup Group B Heaters
NB0209	ESF XFMR XNB02 to NB02
NB0210	480 Volt Load Center NG04
NB0211	Diesel Generator B to NB02
NB0212	ESF Transformer XNB01 to NB02
NB0213	480 Volt Load Center NG02
NB0215	ESW Pump B
NB0216	480 Volt Load Center NG06
NB0217	125 VDC Control Power for NB0201 to NB0217

Power and control cables associated with the components fed by the above listed breakers are also run in area C-10. Damage to the cables could cause a loss of the associated equipment. In addition, bus NB02 control room monitoring circuits are located in the area, and damage could cause loss of control room monitoring capability.

Control cables associated with bus NB02 Synchro-scope and associated switches are run in area C-10. Damage to these cables could prevent some of the monitoring functions for NB02, but would not cause a loss of the NB02 bus.

The main power cables from XNB02 to bus NB02 are run in area C-10. In addition, cables associated with differential protective relay 287/T2 are run in area C-10. Damage to these cables could disrupt power to bus NB02. Based on Calculation XX-E-013, Appendix 2, off-site power to NB01 and NB02 can be lost if a fire occurs in area C-10.

Based on the above discussion, a loss of off-site power can occur on NB01 and NB02 if a fire occurs in this area. Also, based on the discussion later in this evaluation the Train B emergency diesel generator may not be available to supply NB02. Redundant Train A 4.16 kV switchgear bus NB01 is available, powered from the Train A emergency diesel generator. Therefore, loss of power to Train B components identified in the above table will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-13NB04, E-13NB05, E-13NB06, E-13NB11, E-13NB14, E-13NB15, E-13NE02, E-13NG01A, E-13NG10A, E-K3NG01, E-K3NG10A

5.1.9 Local Switchgear Mounted Hand Switches

Several local switchgear mounted hand switches are located in area C-10 and could be damaged by a fire, causing the switch contacts to fail in an undesired position. The following table lists each hand switch as well as a description of what the switch serves.

Local Switchgear Mounted Hand Switches on NB02	
Hand Switch	**Description**
NB0202HIS	Safety Injection Pump B
NB0203HIS	Containment Spray Pump B
NB0204HIS	RHR Pump B
NB0206HIS	Component Cooling Water Pump B
NB0207HIS	Component Cooling Water Pump D
NB0209HIS	ESF XFMR XNB02 to NB02
NB0215HIS	ESW Pump B

Damage to any of these hand switches could cause spurious actuation of the component, which may be undesirable for PFSSD. To prevent maloperation of Train B components, the NB02 bus can be de-energized as described in the following paragraphs. In addition, de-energizing the bus ensures the safety of the fire brigade fighting the fire.

If a fire occurs in area C-10, operators can de-energize the NB02 bus by placing hand switches NBHIS0004 (NB02 normal supply breaker NB0209), NBHIS0005 (NB02 alternate supply breaker NB0212), and NEHIS0026 (NB02 emergency supply breaker NB0211) in pull-to-lock. The hand switches are located in the control room but the breakers are located in the fire affected area. If the control room hand switches do not work due to damage to one or more of these breakers, operators can open breaker PA0201 to de-energize transformer XNB02 by placing NBHIS0001 in pull-to-lock. However, if breaker PA0201 control power is lost due to a short within cables 16NBA11AC or 16NBA11AE, operators can manually trip the breaker using the manual trip push button.

If the Train B diesel generator NE02 starts upon loss of power to the NB02 bus, and breaker NB0211 spuriously closes, then it may be necessary to stop the diesel to prevent re-energizing the NB02 bus. This can be done using control room hand switch KJHS0108A. If control power is lost due to the fire and KJHS0108A is ineffective in shutting down the diesel, then bus NB02 will remain energized, since access to the diesel generator room to manually shut down the diesel generator is not available without traversing fire area C-10. This is acceptable for PFSSD as described below. No E-1F9900 OMA is required for de-energizing NB02 to achieve and maintain hot standby.

Spurious operation of the Containment Spray and Safety Injection pumps could complicate PFSSD. However, spurious operation of the remaining components listed in the above table

will have no adverse impact on PFSSD. For a discussion of the safety injection and containment spray pumps, see Sections 5.2.11 and 5.2.12.

A fire may also cause spurious closure of normally open breaker NB0212, which provides alternate power to NB02 from XNB01. If this occurs, operators can de-energize XNB01 and use Train A diesel generator NE01 to supply power to NB01. To de-energize XNB01, operators can open switchyard breakers 13-8 (Alternate feeder to XNB01) or 13-48 (Normal feeder to XNB01) by placing control room hand switches 1HS-SY018 (13-8) or 1HS-SY022 (13-48) in pull-to-lock.

References: XX-E-013, E-15000, E-13EN01, E-13NB04, E-13NB05, E-13NB06, E-13NB14, E-13NE02, E-13NG01A, E-1000-SY00, E-1000-SY12, E-1000-UU00, E-1005-SY01, E-1005-SY07, KD-7496, SYS NB-320, SYS NB-331

5.1.10 Isolation Handswitch NBHS0014

Hand switch NBHS0014 is an isolation switch that was used in OFN RP-017 to isolate the trip and indication circuits for CCP B, CCW Pump B and ESW Pump B. Revision 18 of OFN RP-017 removed the hand switch from the procedure and added a step for operators to de-energize 125 VDC control power to bus NB02 by opening breaker NK4401. This step ensures the ability to operate Train B components when performing OFN RP-017 in response to a control room fire.

Damage to the hand switch due to a fire in area C-10 could prevent operation of the pumps listed above. Redundant Train A pumps are unaffected by a fire in area C-10 and will be used to achieve safe shutdown.

References: XX-E-013, E-15000, E-13BG01A, E-13EG01C, E-13NE11, E-13NG10A, E-13PG12A E-K3EF01A, E-K3NG10A,

5.1.11 Train B 480 Volt Class 1E Load Center NG02

A fire in area C-10 could disrupt power to 480 Volt Class 1E Load Center NG02 and associated components. The following table identifies the NG02 PFSSD feeder breakers that could be lost in the event of a fire in area C-10.

Train B Class 1E 480 Volt Load Center NG02	
Feeder Breaker	**Description**
NG0201	Transformer XNG02 to Bus NG02
NG0203	125 Volt Vital Battery Charger NK24
NG0205	Control Room Air Conditioning Unit (SGK04B)
NG0206	Control Building MCC NG02A
NG0207	Auxiliary Building MCC NG02B
NG0208	Train B Containment Cooler DSGN01B (NG02T)

In addition, load center NG02 transformer XNG02 is located in area C-10 and could be damaged by the fire.

Power and control cables associated with the equipment shown in the above table are also run in area C-10. These cables are listed in Table C-10-4. Damage to these cables due to a fire could cause a loss of the associated equipment.

Cables supplying 125 VDC control power to NG02 breakers from NK54 are run in area C-10. Damage to these cables could prevent operation of the breakers listed in the above table.

Isolation Switch NGHIS0015 is used in OFN RP-017 to isolate the trip and indication circuits on the NG0201 control circuit. This is done in response to a control room fire to ensure cable damage does not cause the breaker to spuriously trip, which would cause a loss of power to the NG02 bus. Damage to this switch due to a fire could spuriously trip NG0201 and de-energize the NG02 bus.

Redundant Train A components, supplied by NG01 and NG03, are unaffected by a fire in area C-10. Therefore, loss of power to Train B components identified in the above table due to a fire in area C-10 will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11NG02, E-13NG01A, E-13NG11B

5.1.12 Train B 480 Volt Class 1E Control Building MCC NG02A

A fire in area C-10 could disrupt power to 480 Volt Class 1E Control Building MCC NG02A and associated components. The following table identifies the NG02A PFSSD MCC breakers that could be lost in the event of a fire in area C-10.

Train B 480 Volt Load Class 1E Control Building MCC NG02A	
MCC Breaker	**Description**
NG02ABF4	Class 1E Electrical Equip A/C Unit (SGK05B)
NG02ABF5	Incoming Line From Load Center NG02
NG02ABR1	Bypass Voltage Regulating Transformer (NN12)
NG02ACR1	480 vac Distribution Panel
NG02ADF1	Instr Bus Xfmr - Fed By NG02BBF1 (XPN08)
NG02ADF3	RHR Pump Room Cooler Motor (DSGL10B)
NG02ADR1	Centrifugal Charging Pmp Rm Cooler (DSGL12B)
NG02ADR5	CCP B Discharge To RCP Seals Vlv (BGHV8357B)
NG02AEF1	Relay Panel Section
NG02AER4	ESW B To Service Wtr Isolation Vlv (EFHV40)
NG02AFF1	Bypass Voltage Regulating Transformer (NN16)
NG02AFF3	Bypass Voltage Regulating Transformer (NN14)
NG02AFF4	RWST To RHR Pump B Suction Valve (BNHV8812B)
NG02AFR1	ESW A To Service Wtr Isolation Vlv (EFHV39)
NG02AFR2	VCT Outlet Isolation Valve (BGLCV112C)
NG02AFR3	RHR B To SI Pump B Isolation Vlv (EJHV8804B)
NG02AGR3	RHR Mini Flow Iso Valve Loop B (EJFCV611)
NG02AHF1	ESW A/Service Wtr Cross Connect Vlv (EFHV25)
NG02AHF2	ESW B/Service Wtr Cross Connect Vlv (EFHV26)
NG02AHF3	ESW B To Ultimate Heat Sink Iso Vlv (EFHV38)
NG02AHR1	CCP B Miniflow Isolation Valve (BGHV8111)
NG02AHR3	Charging Pump B RWST Suction Vlv (BNLCV112E)

Power and control cables associated with the equipment shown in the above table are also run in area C-10. These cables are listed in Table C-10-4. Damage to these cables due to a fire could cause a loss of the associated equipment.

Redundant Train A components, supplied by NG01A, are unaffected by a fire in area C-10. Therefore, loss of power to Train B components identified in the above table due to a fire in area C-10 will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11NG02, E-11NG20, E-13NG01A, E-13NN01

5.1.13 Train B 480 Volt Class 1E Load Center NG04

A fire in area C-10 could disrupt power to 480 Volt Class 1E Load Center NG04 and associated components. The following table identifies the NG04 PFSSD feeder breakers that could be lost in the event of a fire in area C-10.

Train B Class 1E 480 Volt Load Center NG04	
Feeder Breaker	**Description**
NG0401	Transformer XNG04 to Bus NG04
NG0403	125 Volt Vital Battery Charger NK22
NG0405	Train B Containment Cooler DSGN01D
NG0406	Auxiliary Building MCC NG04C
NG0407	Control Building MCC NG04D
NG0408	Train B Diesel Generator Room Supply Fan (DCGM01B)
NG0409	125 Volt Non-Vital Battery Charger PK22
NG0410	125VDC Non-Class 1E Battery Charger (PK24)
NG0411	125 Volt Swing Battery Charger NK26

In addition, load center NG04 transformer XNG04 is located in area C-10 and could be damaged by the fire.

Power and control cables associated with the equipment shown in the above table are also run in area C-10. These cables are listed in Table C-10-4. Damage to these cables due to a fire could cause a loss of the associated equipment.

Cables supplying 125 VDC control power to NG04 breakers from NK44 are run in area C-10. Damage to these cables could prevent operation of the breakers listed in the above table.

Isolation Switch NGHIS0016 is used in OFN RP-017 to isolate the trip and indication circuits on the NG0401 control circuit. This is done in response to a control room fire to ensure cable damage does not cause the breaker to spuriously trip, which would cause a loss of power to the NG04 bus. Damage to this switch due to a fire could spuriously trip NG0401 and de-energize the NG04 bus.

Redundant Train A components, supplied by NG01 and NG03, are unaffected by a fire in area C-10. Therefore, loss of power to Train B components identified in the above table due to a fire in area C-10 will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11NG02, E-11PK02, E-13NG01A, E-13NG11A, E-13PK11, DCP 13324

5.1.14 Swing Battery Charger NK26

Swing battery charger NK26 provides backup power and battery charging to Train B 125 VDC busses NK02 and NK04 and battery banks NK12 and NK14. Swing battery charger NK26 allows battery chargers NK22 or NK24 to be taken out of service without loss of power to NK02 or NK04. A fire in area C-10 could cause damage to battery charger NK26, or could cause a loss of 480 VAC power to the battery charger, which would render it inoperable. In addition, the fire could cause damage to the power cables between NK26 transfer switch NK76 and transfer switches NK72 and NK74.

Battery chargers NK22 and NK24, and battery banks NK12 and NK14 are located in a different fire area. However, cables supplying 480 VAC power to battery chargers NK22 and NK24 are run in area C-10. Power to these chargers is supplied by 480 VAC breakers NG0203 (NK24) and NG0403 (NK22). In the event a fire in C-10 damages battery charger NK26, and disrupts charging power to NK22 and NK24, power to Train B busses NK02 and NK04 will still be available through battery banks NK12 and NK14, since the batteries are unaffected by a fire in area C-10. In the event power to NK02 and NK04 is unavailable, redundant Train A 125 VDC system remains available.

Transfer switches NK76 and NK78 are also located in area C-10. Damage to these switches and associated cables due to a fire will have no adverse impact on safe shutdown due to the availability of redundant Train A components in a different fire area.

Hand switches NKHS0026 and NKHS0411 may also be damaged by the fire. However, due to the availability of Train A 125 VDC system, this will have no adverse impact on PFSSD.

Based on the above discussion, a loss of swing battery charger NK26 and associated transfer switches will not adversely impact the ability to achieve and maintain safe shutdown due to the availability of redundant Train A components.

References: XX-E-013, E-15000, E-11NK01, E-11NK02, E-11NG02, E-13NK10, E-13NK12A

5.1.15 Auxiliary Relay Rack RP140

Relay rack RP140 contains a number of PFSSD relays used for operation of Train B equipment. The following table identifies the PFSSD relays located in panel RP140.

RP140 Auxiliary Relays	
Relay #	**Description**
1XEF32	ESW Pump Motor B Interposing Relay
1XEF34	ESW Pump Motor B Interposing Relay
1XEF36	ESW Pump Motor B Interposing Relay
3XEG05	CCW Pump B Auxiliary Relay
3XEG07	CCW Pump D Auxiliary Relay
62XBB02	Pressurizer PORV Block Valve Auxiliary Relay
62XBB04	Pressurizer PORV Block Valve Auxiliary Relay
63TDEEG06	CCW Pump B Auxiliary Relay
63TDEEG08	CCW Pump D Auxiliary Relay
83XGK02	GKHZ0040A/40B Auxiliary Relay
K4119	Load Sequencer Relay

A fire in area C-10 could damage panel RP140 and associated PFSSD relays shown in the above table. In addition, cables supplying 125 VDC and 120 VAC power to the various relays within RP140 are run in area C-10. Damage to the power cables and/or relays could prevent operation of the associated component, or could cause the component to spuriously operate. If the components spuriously operate, PFSSD is assured since spurious operation of these components will not have an adverse impact on the ability to achieve and maintain PFSSD.

Redundant relay panel RP139, containing redundant PFSSD relays for Train A components, is located in fire area C-9 and is unaffected by a fire in area C-10. Cables associated with RP139 do not run through area C-10.

References: XX-E-013, E-15000, E-13RP09

5.1.16 BOP Instrument Racks RP147A and RP147B

Instrument racks RP147A and RP147B house logic and instrumentation controls for various PFSSD functions associated with alternative and dedicated safe shutdown (fire in the control room). These functions are associated with steam generator and auxiliary feedwater control for steam generators B and D. The control room evacuation procedure (OFN RP-017) uses steam generators B and D, as well as the Turbine Driven Auxiliary Feedwater Pump (TDAFP) and the Train B Motor Driven Auxiliary Feedwater Pump to achieve safe shutdown if a fire occurs in the control room.

One PFSSD function supported by instrument racks RP147A and RP147B is atmospheric control of steam generator atmospheric relief valves (ARV) ABPV0002 and ABPV0004, respectively. The PFSSD methodology requires steam generator atmospheric control on all four steam generators.

Cables and components associated with steam generator atmospheric relief valves ABPV0001 and ABPV0003 are not located in area C-10 and are therefore unaffected by the fire. Steam generator atmospheric control on steam generators A and C can therefore be achieved.

A fire in area C-10 uses primarilly Train A equipment, including Train A motor driven auxiliary feedwater pump (MDAFP). The Train A MDAFP is aligned to supply auxiliary feedwater to steam generators B and C. Steam generator ARV ABPV0002 is located on the steam generator B loop (loop 2) whereas steam generator ARV ABPV0004 is located on the steam generator D loop (loop 4).

A fire in area C-10 could cause a loss of control of steam generator ARVs ABPV0002 and ABPV0004. Since Train A MDAFP is used to supply auxiliary feedwater to SGs B and C, it is desired that atmospheric control on SGs B and C be achieved and that the ARVs on SGs A and D be closed. As stated above, atmospheric control on SG C is unaffected by a fire in area C-10. However, atmospheric control on SG B could be affected. If SG B ARV ABPV0002 fails to open, operators can manually control it using local controller ABFHC0002 located in fire area A-23. If ARV ABPV0002 spuriously opens, then that is the desired position. However, to re-gain control of the ARV, operators can use local controller ABFHC0002.

Steam generator D ARV ABPV0004 control could be lost if a fire occurs in area C-10. If the ARV remains closed, that is the desired PFSSD position. If the ARV spuriously opens, operators can isolate the air and nitrogen supply to fail the ARV closed. Air is isolated by closing valve KAV1429 and nitrogen is isolated by closing valve KAV1365. The air and nitrogen supply valves are located in fire area A-23 and access is available without having to traverse area C-10.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

Instrument racks RP147A and RP147B also house instrumentation for the TDAFP and the Train B motor driven auxiliary feedwater pump. Pressure transmitter ALPT0026, located on the TDAFP suction, sends a signal to panel RP147A which then sends the signal to pressure indicators in the control room and auxiliary shutdown panel. Pressure transmitter ALPT0024, located on the Train B MDAFP suction, sends a signal to panel RP147B where it is then sent to pressure indicators in the control room and auxiliary shutdown panel. These signals allow operators to monitor suction pressure on the TDAFP and the Train B MDAFP during normal conditions and emergency shutdown due to a fire in the control room.

Instrument rack RP147A also contains circuits for the TDAFP speed governing valve FCFV0313. Damage to these circuits could prevent operation of the valve. If this valve fails full open at the same time valve FCHV0312 fails open, the TDAFP would likely trip on high speed. If the valve fails closed, the TDAFP will not be operable but the Train A MDAFP remains available to ensure safe shutdown.

Loss of pressure transmitters or a spurious pressure signal on the TDAFP and Train B MDAFP suction headers will not adversely impact PFSSD since the Train A MDAFP pressure transmitter ALPT0025 is unaffected by a fire in area C-10.

Flow transmitter ALFT0001, located on the auxiliary feedwater supply header to steam generator D, sends a signal to panel RP147B where it is then sent to flow indicators in the control room and auxiliary shutdown panel. This allows operators to monitor auxiliary feedwater flow to steam generator D during normal conditions and emergency shutdown due to a fire in the control room.

Loss of flow transmitter ALFT0001 will not adversely impact PFSSD since a fire in area C-10 uses Train A MDAFP supplying steam generators B and C.

Based on the above discussion, PFSSD can be achieved if a fire in area C-10 affects instrument racks RP147A and RP147B.

References: XX-E-013, E-15000, E-13AB20A, E-13AB20B, E-13AL07B, E-13FC24, E-13RP09, E-1F9101, J-110-00933, J-110-00934

5.1.17 Steam Generator Feedwater Pumps

Main feedwater pump steam supply valves FCFV0005 and FCFV0105 are credited in the PFSSD analysis to trip the main feedwater pumps if the main steam isolation valves (MSIVs) are affected by a fire. Closing the MSIVs stops steam flow to the feedwater pumps' turbines and stops the feedwater pumps. The steam generator feedwater pumps are tripped in the event of a fire to prevent overfilling the steam generators.

Non-Class 1E 120 VAC Inverter PN10 and distribution panel PN10A provide power to FCFV0105 trip relays in panel FC170C. Cable 16RPY10AA supplies power from PN0806 to inverter PN10. Cable 16RPY10AB supplies power from inverter PN10 to distribution panel PN10A. Cable 16FCY35AA provides the primary source of 120 VAC power from distribution panel PN010A to panel FC170A, which distributes power to the trip relays in panel FC170C. The alternate source of power to panel FC170A is not credited for PFSSD and is assumed lost.

A fire in area C-10 could damage inverter PN10, distribution panel PN10A or cables 16FCY35AA, 16RPY10AA or 16RPY10AB. If this occurs, operators in the control room would

not be able to close valve FCFV0105 to stop steam flow to steam generator feedwater pump PAE01B.

A fire in area C-10 will not affect the ability to close the MSIVs from the control room. All-close hand switches ABHS0079 and ABHS0080 are unaffected and can be used to close the MSIVs from the control room.

Based on the above discussion, valve FCFV0105 may not close if a fire occurs in this area. However, the MSIVs can be closed using either hand switch ABHS0079 or ABHS0080 in the main control room. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-13FC35, E-13RP10, E-1F9103, E-1F9421

5.2 PFSSD CABLE EVALUATION

Table C-10-4 lists all the PFSSD cables (S. in E-15000) located in fire area C-10. The applicable evaluation section is also listed in Table C-10-4.

Table C-10-4
PFSSD Cables Located in Fire Area C-10

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11NFK01DA	3302	NF039B	C	5.2.1	Load Shedder / Emergency Load Sequencer
11NFY01FA	3302	NF039B	C	5.2.1	Load Shedder / Emergency Load Sequencer
12ABI20FE	3302	ABPV0002	I	5.1.16	Steam Generator B Atmospheric Relief Valve
12ABI20FG	3302	ABPV0002	I	5.1.16	Steam Generator B Atmospheric Relief Valve
12ABI20FH	3302	ABPV0002	I	5.1.16	Steam Generator B Atmospheric Relief Valve
12ABI20FJ	3302	ABPV0002	I	5.1.16	Steam Generator B Atmospheric Relief Valve
12ABI20FK	3302	ABPV0002	I	5.1.16	Steam Generator B Atmospheric Relief Valve
12ABI20FL	3302	ABPV0002	I	5.1.16	Steam Generator B Atmospheric Relief Valve
12ABI20FM	3302	ABPV0002	I	5.1.16	Steam Generator B Atmospheric Relief Valve
12ABI20FN	3302	ABPV0002	I	5.1.16	Steam Generator B Atmospheric Relief Valve
12ABK01AD	3302	ABHV0005	C	5.1.6	Main Steam Supply to TDAFP
12ABK01AE	3302	ABHV0005	C	5.1.6	Main Steam Supply to TDAFP
12ABK01AF	3302	ABHV0005	C	5.1.6	Main Steam Supply to TDAFP
12ABK01AG	3302	ABHV0005	C	5.1.6	Main Steam Supply to TDAFP
12ABK01BD	3302	ABHV0006	C	5.1.6	Main Steam Supply to TDAFP
12ABK01BE	3302	ABHV0006	C	5.1.6	Main Steam Supply to TDAFP
12ABK01BF	3302	ABHV0006	C	5.1.6	Main Steam Supply to TDAFP
12ABK01BG	3302	ABHV0006	C	5.1.6	Main Steam Supply to TDAFP
12AEI08GB	3302	AELT0502	I	5.1.5	Steam Generator B Wide Range Water Level
12ALI07KD	3302	ALPT0026	I	5.1.16	TDAFP Suction Pressure
12ALI07KE	3302	ALPT0026	I	5.1.16	TDAFP Suction Pressure
12ALI07KF	3302	ALPT0026	I	5.1.16	TDAFP Suction Pressure
12BBI15HB	3302	BBTE0423B	I	5.1.5	RCS Loop 2 Cold Leg Temperature

Table C-10-4
PFSSD Cables Located in Fire Area C-10

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12BBI15JB	3302	BBTE0443A	I	5.1.5	RCS Loop 4 Hot Leg Temperature
12BBI16QB	3302	BBLT0460	I	5.1.5	Pressurizer Narrow Range Level Transmitter
12FCK23AA	3302	FCHV0312	C	5.1.6	TDAFP Trip and Throttle Valve
12FCK23AR	3302	FCHV0312	C	5.1.6	TDAFP Trip and Throttle Valve
12FCK23AS	3302	FCHV0312	C	5.1.6	TDAFP Trip and Throttle Valve
12FCK23AU	3302	FCHV0312	C	5.1.6	TDAFP Trip and Throttle Valve
12FCK23AX	3302	FCHV0312 FCFV0313	C	5.1.6	TDAFP Trip and Throttle Valve TDAFP Speed Governing Valve
12FCK24AK	3302	FCFV0313	I	5.1.16	TDAFP Speed Control and Monitoring
12FCK24AL	3302	FCFV0313	I	5.1.16	TDAFP Speed Control and Monitoring
12FCK24AM	3302	FCFV0313	I	5.1.16	TDAFP Speed Control and Monitoring
12FCK24AN	3302	FCFV0313	I	5.1.16	TDAFP Speed Control and Monitoring
12FCK24AP	3302	FCFV0313	I	5.1.16	TDAFP Speed Control and Monitoring
12FCK24AQ	3302	FCFV0313	I	5.1.16	TDAFP Speed Control and Monitoring
12FCK24AU	3302	FCFV0313	I	5.1.16	TDAFP Speed Control and Monitoring
12NFK01CA	3302	NF039A	C	5.2.1	Load Shedder / Emergency Load Sequencer
12NFK01DA	3302	NF039B	C	5.2.1	Load Shedder / Emergency Load Sequencer
12NFY01EA	3302	NF039A	C	5.2.1	Load Shedder / Emergency Load Sequencer
12NFY01FA	3302	NF039B	C	5.2.1	Load Shedder / Emergency Load Sequencer
12NKK02AY	3302	NK26	P	5.1.14	+ 125 VDC from NK76 to NK72
12NKK02AZ	3302	NK26	P	5.1.14	- 125 VDC from NK76 to NK72
12NNK01LA	3302	NN16	P	5.2.19	125 VDC Power to Swing Inverter NN16
12NNK01LB	3302	NN16	P	5.2.19	125 VDC Power to Swing Inverter NN16

Table C-10-4
PFSSD Cables Located in Fire Area C-10

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12NNY01GA	3302	NN12	P	5.2.19	120 VAC Pwr to NN12 from Swing Inv NN16
12NNY01GB	3302	NN12	P	5.2.19	120 VAC Pwr to NN12 from Swing Inv NN16
12RPK09BA	3302	RP334	P	5.1.6	125 VDC Power to RP334
12RPK15AA	3302	Relay 86XRP1	C	5.1.6	Control Room Lockout Relay
12RPK15BA	3302	Relay 86XRP2	C	5.1.6	Control Room Lockout Relay
12RPK15CA	3302	Relay 86XRP3	C	5.1.6	Control Room Lockout Relay
12RPY09BA	3302	RP147A	P	5.1.16	Class 1E 120 VAC Power to RP147A
12SBS16AA	3302	AELI0502A	I	5.1.5	Steam Generator B Water Level
12SBS16BA	3302	BBTI0423X	I	5.1.5	RCS Cold Leg Loop 2 Temperature
12SBS16GA	3302	BBLI0460B	I	5.1.5	Pressurizer Level
12SBS16HA	3302	BBTI0443A	I	5.1.5	RCS Hot Leg Loop 4 Temperature
12SBY09GA	3302	SB148A	P	5.1.5	Class 1E 120 VAC Power to SB148A
13NFK01DA	3302	NF039B	C	5.2.1	Load Shedder / Emergency Load Sequencer
13NFY01HA	3302	NF039B	C	5.2.1	Load Shedder / Emergency Load Sequencer
14ABI20HE	3302	ABPV0004	I	5.1.16	Steam Generator D Atmospheric Relief Valve
14ABI20HG	3302	ABPV0004	I	5.1.16	Steam Generator D Atmospheric Relief Valve
14ABI20HH	3302	ABPV0004	I	5.1.16	Steam Generator D Atmospheric Relief Valve
14ABI20HJ	3302	ABPV0004	I	5.1.16	Steam Generator D Atmospheric Relief Valve
14ABI20HK	3302	ABPV0004	I	5.1.16	Steam Generator D Atmospheric Relief Valve
14ABI20HL	3302	ABPV0004	I	5.1.16	Steam Generator D Atmospheric Relief Valve
14ABI20HM	3302	ABPV0004	I	5.1.16	Steam Generator D Atmospheric Relief Valve
14ABI20HN	3302	ABPV0004	I	5.1.16	Steam Generator D Atmospheric Relief Valve
14AEI08LB	3302	AELT0504	I	5.1.5	Steam Generator D Wide Range Water Level

Table C-10-4
PFSSD Cables Located in Fire Area C-10

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALB01B2	3302	PAL01B	C	5.2.2	Train B Motor Driven Auxiliary Feedwater Pump
14ALB01BA	3302	PAL01B	P	5.2.2	Train B Motor Driven Auxiliary Feedwater Pump
14ALB01BG	3302	PAL01B	C	5.2.2	Train B Motor Driven Auxiliary Feedwater Pump
14ALB01BJ	3302	PAL01B	C	5.2.2	Train B Motor Driven Auxiliary Feedwater Pump
14ALB01BL	3302	PAL01B	C	5.2.2	Train B Motor Driven Auxiliary Feedwater Pump
14ALB01BM	3302	PAL01B	C	5.2.2	Train B Motor Driven Auxiliary Feedwater Pump
14ALG02AF	3302	ALHV0034	C	5.1.6	CST to Train B MDAFP
14ALG02AG	3302	ALHV0034	C	5.1.6	CST to Train B MDAFP
14ALG02AH	3302	ALHV0034	C	5.1.6	CST to Train B MDAFP
14ALG02AK	3302	ALHV0034	C	5.1.6	CST to Train B MDAFP
14ALG04AF	3302	ALHV0030	C	5.1.6	ESW to Train B MDAFP
14ALG04AG	3302	ALHV0030	C	5.1.6	ESW to Train B MDAFP
14ALG04AH	3302	ALHV0030	C	5.1.6	ESW to Train B MDAFP
14ALG04AK	3302	ALHV0030	C	5.1.6	ESW to Train B MDAFP
14ALG04DF	3302	ALHV0033	C	5.1.6	Train B ESW to TDAFP
14ALG04DG	3302	ALHV0033	C	5.1.6	Train B ESW to TDAFP
14ALG04DH	3302	ALHV0033	C	5.1.6	Train B ESW to TDAFP
14ALG04DK	3302	ALHV0033	C	5.1.6	Train B ESW to TDAFP
14ALI03AG	3302	ALHV0005	I	5.1.1	Train B MDAFP to SG D

Table C-10-4
PFSSD Cables Located in Fire Area C-10

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALI03AH	3302	ALHV0005	I	5.1.1	Train B MDAFP to SG D
14ALI03AJ	3302	ALHV0005	I	5.1.1	Train B MDAFP to SG D
14ALI03AK	3302	ALHV0005	I	5.1.1	Train B MDAFP to SG D
14ALI03AL	3302	ALHV0005	I	5.1.1	Train B MDAFP to SG D
14ALI03AM	3302	ALHV0005	I	5.1.1	Train B MDAFP to SG D
14ALI03AP	3302	ALHV0005	I	5.1.1	Train B MDAFP to SG D
14ALI05AG	3302	ALHV0010	I	5.2.3	TDAFP to SG B
14ALI05AH	3302	ALHV0010	I	5.2.3	TDAFP to SG B
14ALI05AJ	3302	ALHV0010	I	5.2.3	TDAFP to SG B
14ALI05AK	3302	ALHV0010	I	5.2.3	TDAFP to SG B
14ALI05AM	3302	ALHV0010	I	5.2.3	TDAFP to SG B
14ALI05AN	3302	ALHV0010	I	5.2.3	TDAFP to SG B
14ALI05AQ	3302	ALHV0010	I	5.2.3	TDAFP to SG B
14ALI07AD	3302	ALFT0001	I	5.1.16	AFW to SG D Flow Transmitter
14ALI07AE	3302	ALFT0001	I	5.1.16	AFW to SG D Flow Transmitter
14ALI07HD	3302	ALPT0024	I	5.1.16	Train B MDAFP Suction Pressure
14ALI07HE	3302	ALPT0024	I	5.1.16	Train B MDAFP Suction Pressure
14ALI07HF	3302	ALPT0024	I	5.1.16	Train B MDAFP Suction Pressure
14ALY09AD	3302	ALHV0005	C	5.1.1	Train B MDAFP to SG D
14BBG39BF	3302	BBHV8000B	C	5.1.2	Pressurizer PORV Block Valve
14BBG39BJ	3302	BBHV8000B	C	5.1.2	Pressurizer PORV Block Valve
14BBI16BA	3302	BBPT0406	I	5.1.5	RCS Pressure Transmitter
14BBI16BB	3302	BBPT0406	I	5.1.5	RCS Pressure Transmitter

Table C-10-4
PFSSD Cables Located in Fire Area C-10

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BGB01BA	3302	PBG05B	P	5.2.4	Train B Centrifugal Charging Pump
14BGB01BB	3302	PBG05B	C	5.2.4	Train B Centrifugal Charging Pump
14BGG11DA	3302	BGHV8111	P	5.2.4	Train B CCP Miniflow Valve
14BGG11DB	3302	BGHV8111	C	5.2.4	Train B CCP Miniflow Valve
14BGG11DC	3302	BGHV8111	C	5.2.4	Train B CCP Miniflow Valve
14BGG11DD	3302	BGHV8111	C	5.2.4	Train B CCP Miniflow Valve
14BGG12BA	3302	BGLCV0112C	P	5.1.3	VCT Outlet Valve
14BGG12BB	3302	BGLCV0112C	C	5.1.3	VCT Outlet Valve
14BGG12BC	3302	BGLCV0112C	C	5.1.3	VCT Outlet Valve
14BGG12BD	3302	BGLCV0112C	C	5.1.3	VCT Outlet Valve
14BGG12BE	3302	BGLCV0112C	C	5.1.3	VCT Outlet Valve
14BGG52BA	3302	BGHV8357B	P	5.2.5	Train B RCP Seal Injection Valve
14BGG52BB	3302	BGHV8357B	C	5.2.5	Train B RCP Seal Injection Valve
14BGG52BC	3302	BGHV8357B	C	5.2.5	Train B RCP Seal Injection Valve
14BNG01BA	3302	BNLCV0112E	P	5.2.6	RWST to CCP B
14BNG01BB	3302	BNLCV0112E	C	5.2.6	RWST to CCP B
14BNG01BC	3302	BNLCV0112E	C	5.2.6	RWST to CCP B
14BNG01BD	3302	BNLCV0112E	C	5.2.6	RWST to CCP B
14BNG03BA	3302	BNHV8812B	P	5.1.4	RWST to RHR Pump B Suction Valve
14BNG03BB	3302	BNHV8812B	C	5.1.4	RWST to RHR Pump B Suction Valve
14BNG03BC	3302	BNHV8812B	C	5.1.4	RWST to RHR Pump B Suction Valve
14BNG03BJ	3302	BNHV8812B	C	5.1.4	RWST to RHR Pump B Suction Valve
14EFB01SA	3302	PEF01B	C	5.2.7	Train B ESW Pump

Table C-10-4
PFSSD Cables Located in Fire Area C-10

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EFB01SC	3302	PEF01B	C	5.2.7	Train B ESW Pump
14EFB01SE	3302	PEF01B	P	5.2.7	Train B ESW Pump
14EFB01SF	3302	PEF01B	P	5.2.7	Train B ESW Pump
14EFG02CA	3302	EFHV0025	P	5.2.8	Service Water to Train A ESW
14EFG02CB	3302	EFHV0025	C	5.2.8	Service Water to Train A ESW
14EFG02CC	3302	EFHV0025	C	5.2.8	Service Water to Train A ESW
14EFG02CD	3302	EFHV0025	C	5.2.8	Service Water to Train A ESW
14EFG02CE	3302	EFHV0025	C	5.2.8	Service Water to Train A ESW
14EFG02CF	3302	EFHV0025	C	5.2.8	Service Water to Train A ESW
14EFG02DA	3302	EFHV0026	P	5.2.8	Service Water to Train B ESW
14EFG02DB	3302	EFHV0026	C	5.2.8	Service Water to Train B ESW
14EFG02DC	3302	EFHV0026	C	5.2.8	Service Water to Train B ESW
14EFG02DD	3302	EFHV0026	C	5.2.8	Service Water to Train B ESW
14EFG02DE	3302	EFHV0026	C	5.2.8	Service Water to Train B ESW
14EFG02DF	3302	EFHV0026	C	5.2.8	Service Water to Train B ESW
14EFG02SD	3302	FEF01B	C	5.2.7	Train B ESW Traveling Water Screen
14EFG03AA	3302	EFHV0039	P	5.2.8	ESW to Service Water Cross Connect Valve
14EFG03AB	3302	EFHV0039	C	5.2.8	ESW to Service Water Cross Connect Valve
14EFG03AC	3302	EFHV0039	C	5.2.8	ESW to Service Water Cross Connect Valve
14EFG03AD	3302	EFHV0039	C	5.2.8	ESW to Service Water Cross Connect Valve
14EFG03AE	3302	EFHV0039	C	5.2.8	ESW to Service Water Cross Connect Valve
14EFG03BA	3302	EFHV0040	P	5.2.8	ESW to Service Water Cross Connect Valve
14EFG03BB	3302	EFHV0040	C	5.2.8	ESW to Service Water Cross Connect Valve

Table C-10-4
PFSSD Cables Located in Fire Area C-10

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EFG03BC	3302	EFHV0040	C	5.2.8	ESW to Service Water Cross Connect Valve
14EFG03BD	3302	EFHV0040	C	5.2.8	ESW to Service Water Cross Connect Valve
14EFG03BE	3302	EFHV0040	C	5.2.8	ESW to Service Water Cross Connect Valve
14EFG03SD	3302	EFHV0092	C	5.2.7	Train B ESW Screen Wash Valves
14EFG06BA	3302	EFHV0038	P	5.2.8	ESW to UHS Isolation Valve
14EFG06BB	3302	EFHV0038	C	5.2.8	ESW to UHS Isolation Valve
14EFG06BC	3302	EFHV0038	C	5.2.8	ESW to UHS Isolation Valve
14EFG06SD	3302	EFHV0098	C	5.2.7	Train B ESW Pump Air Release Valve
14EFG06SE	3302	EFHV0098	C	5.2.7	Train B ESW Pump Air Release Valve
14EFK01SA	3302	PEF01B	C	5.2.7	Train B ESW Pump
14EFY10DA	3302	EFHV0098	C	5.2.7	Train B ESW Pump Air Release Valve
14EGB01BA	3302	PEG01B	P	5.2.9	Component Cooling Water Pump B
14EGB01BB	3302	PEG01B	C	5.2.9	Component Cooling Water Pump B
14EGB01BC	3302	PEG01B	C	5.2.9	Component Cooling Water Pump B
14EGB01BD	3302	PEG01B	C	5.2.9	Component Cooling Water Pump B
14EGB01BE	3302	PEG01B	C	5.2.9	Component Cooling Water Pump B
14EGB01BG	3302	PEG01B	C	5.2.9	Component Cooling Water Pump B
14EGB01BH	3302	PEG01B	C	5.2.9	Component Cooling Water Pump B
14EGB01BK	3302	PEG01B	C	5.2.9	Component Cooling Water Pump B
14EGB01BL	3302	PEG01B	C	5.2.9	Component Cooling Water Pump B
14EGB01DA	3302	PEG01D	P	5.2.9	Component Cooling Water Pump D
14EGB01DB	3302	PEG01D	C	5.2.9	Component Cooling Water Pump D
14EGB01DC	3302	PEG01D	C	5.2.9	Component Cooling Water Pump D

Table C-10-4
PFSSD Cables Located in Fire Area C-10

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EGB01DD	3302	PEG01D	C	5.2.9	Component Cooling Water Pump D
14EGB01DE	3302	PEG01D	C	5.2.9	Component Cooling Water Pump D
14EGB01DG	3302	PEG01D	C	5.2.9	Component Cooling Water Pump D
14EGG05DD	3302	EGHV0054	C	5.2.9	CCW B to Service Loop
14EJB01BA	3302	PEJ01B	P	5.2.10	Train B RHR Pump
14EJB01BB	3302	PEJ01B	C	5.2.10	Train B RHR Pump
14EJG04BA	3302	EJHV8804B	P	5.2.10	Train B RHR Pump to SI Pumps
14EJG04BB	3302	EJHV8804B	C	5.2.10	Train B RHR Pump to SI Pumps
14EJG04BC	3302	EJHV8804B	C	5.2.10	Train B RHR Pump to SI Pumps
14EJG08BB	3302	EJFCV0611	C	5.2.10	Train B RHR Pump Miniflow Valve
14EJG08BC	3302	EJFCV0611	C	5.2.10	Train B RHR Pump Miniflow Valve
14EJG08BE	3302	EJFCV0611	P	5.2.10	Train B RHR Pump Miniflow Valve
14EJG08BF	3302	EJFIS0611	C	5.2.10	Train B RHR Pump Miniflow Switch
14EMB01BB	3302	PEM01B	C	5.2.11	Train B Safety Injection Pump
14ENB01BB	3302	PEN01B	C	5.2.12	Train B Containment Spray Pump
14GDG01BE	3302	CGD01B	C	5.1.7	ESW Pump Room Supply Fan
14GDG01BF	3302	CGD01B	C	5.1.7	ESW Pump Room Supply Fan
14GDG01BH	3302	CGD01B	C	5.1.7	ESW Pump Room Supply Fan
14GDI04BF	3302	GDTE0011	I	5.1.7	Train B ESW Pump Room Temperature Element
14GDI04BG	3302	GDTZ0011A	I	5.1.7	Train B ESW Pump Room Inlet Damper
14GDI04BH	3302	GDTZ0011B	I	5.1.7	Train B ESW Pump Room Recirc Damper
14GDY01BB	3302	CGD01B	C	5.1.7	Train B ESW Pump Room Supply Fan

Table C-10-4
PFSSD Cables Located in Fire Area C-10

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GDY01BD	3302	CGD01B	C	5.1.7	Train B ESW Pump Room Supply Fan
14GFG01BC	3302	SGF02B	C	5.2.2	Train B Motor Driven AFP Room Cooler
14GKG02BA	3302	SGK04B	P	5.2.13	Train B Control Room A/C Unit
14GKG13BA	3302	SGK05B	P	5.2.14	Train B Class 1E A/C Unit
14GKG13BG	3302	SGK05B	C	5.2.14	Train B Class 1E A/C Unit
14GKG13BH	3302	SGK05B	C	5.2.14	Train B Class 1E A/C Unit
14GKY02BA	3302	GKHZ0040A/B	C	5.2.13	Train B Control Room A/C Unit Dampers
14GKY02BB	3302	GKHZ0040B	C	5.2.13	Train B Control Room A/C Unit Damper
14GKY02BC	3302	GKHZ0040A	C	5.2.13	Train B Control Room A/C Unit Damper
14GKY02BD	3302	GKHZ0040A/B	C	5.2.13	Train B Control Room A/C Unit Dampers
14GKY02BE	3302	GKHZ0040A/B	P	5.2.13	Train B Control Room A/C Unit Dampers
14GKY02BF	3302	GKHZ0040A/B	P	5.2.13	Train B Control Room A/C Unit Dampers
14GLG05BA	3302	SGL10B	P	5.2.10	Train B RHR Room Cooler
14GLG05BD	3302	SGL10B	C	5.2.10	Train B RHR Room Cooler
14GLG05HA	3302	SGL12B	P	5.2.4	Train B CCP Room Cooler
14GLG05HD	3302	SGL12B	C	5.2.4	Train B CCP Room Cooler
14GLG06BD	3302	SGL11B	C	5.2.9	Train B CCW Pump Room Cooler
14GMG01BL	3302	DCGM01B	P	5.1.13	Train B Diesel Generator Room Supply Fan
14GMG01BH	3302	GMHS0011B	C	5.2.15	Train B Diesel Generator Room Supply Fan Isolation Switch
14GMG01BK	3302	GMTSL0011	C	5.2.15	Train B Diesel Generator Room Supply Fan 1B Temp Switch Low
14GMI02CA	3302	GMTE0011	I	5.2.15	Train B Diesel Generator Room Temperature Element

Table C-10-4
PFSSD Cables Located in Fire Area C-10

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GMI02CB	3302	GMTZ0011A	I	5.2.15	Train B Diesel Generator Room Inlet Damper
14GMI02CC	3302	GMTZ0011B	I	5.2.15	Train B Diesel Generator Room Recirc Damper
14GMK04BA	3302	GMHZ19	C	5.2.15	Train B DG Room Exhaust Damper
14GMK04BB	3302	GMHZ19	C	5.2.15	Train B DG Room Exhaust Damper
14GMK04BE	3302	GMHZ19	C	5.2.15	Train B DG Room Exhaust Damper
14JEG01BB	3302	PJE01B	C	5.2.16	Train B EDG Fuel Oil Transfer Pump
14JEG01BD	3302	PJE01B	C	5.2.16	Train B EDG Fuel Oil Transfer Pump
14JEG01BE	3302	PJE01B	C	5.2.16	Train B EDG Fuel Oil Transfer Pump
14JEI04BA	3302	JELT0021	I	5.2.16	Train B EDG Day Tank Level Transmitter
14KJK03AA	3302	KJ122	P	5.2.17	Train B Diesel Generator Control Panel
14KJK03AH	3302	KJ122	C	5.2.17	Train B Diesel Generator Control Panel
14KJK03AJ	3302	KJ122	C	5.2.17	Train B Diesel Generator Control Panel
14KJK03AK	3302	KJ122	C	5.2.17	Train B Diesel Generator Control Panel
14KJK07AE	3302	KKJ01B	C	5.2.17	Train B Diesel Generator
14NBB04AB	3302	NBHS0011	C	5.1.8	NB02 Synchro-scope/Selector Switch
14NBB04AD	3302	NBHS0011	C	5.1.8	NB02 Synchro-scope/Selector Switch
14NBB04AE	3302	NBHS0011	C	5.1.8	NB02 Synchro-scope/Selector Switch
14NBB04AF	3302	NBHS0011	C	5.1.8	NB02 Synchro-scope/Selector Switch
14NBB05AC	3302	NBHS0008	C	5.1.8	XNB02 to NB0209 Synch Transfer Switch
14NBB06AC	3302	NBHS0009	C	5.1.8	XNB02 to NB0212 Synch Transfer Switch
14NBB14AA	3302	NB0209	C	5.1.8	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AB	3302	NB0209	C	5.1.8	Bus NB02 Feeder Breaker NB0209 Control

Table C-10-4
PFSSD Cables Located in Fire Area C-10

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NBB14AC	3302	NB0209	C	5.1.8	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AD	3302	NB0209	C	5.1.8	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AE	3302	NB0209	C	5.1.8	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AF	3302	NB0209	C	5.1.8	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AG	3302	NB0209	C	5.1.8	Bus NB02 Feeder Breaker NB0209 Control
14NBB15AA	3302	NB0212	C	5.1.8	Bus NB02 Feeder Breaker NB0212 Control
14NBB15AC	3302	NB0212	C	5.1.8	Bus NB02 Feeder Breaker NB0212 Control
14NBK15AA	3302	NB02	P	5.1.8	125 VDC Bus NB02 Breaker Control Power
14NBK15AB	3302	NB02	P	5.1.8	125 VDC Bus NB02 Breaker Control Power
14NEB02AA	3302	NE002	P	5.2.18	Train B Diesel Generator
14NEB02AB	3302	NE002	P	5.2.18	Train B Diesel Generator
14NEB02AC	3302	NE002	P	5.2.18	Train B Diesel Generator
14NEB02AL	3302	NE002	C	5.2.18	Train B Diesel Generator
14NEB02AM	3302	NE002	C	5.2.18	Train B Diesel Generator
14NEB02AP	3302	NE002	P	5.2.18	Train B Diesel Generator
14NEB02AV	3302	NE002	P	5.2.18	Train B Diesel Generator
14NEB11AA	3302	NB0211	C	5.2.18	Train B D/G Feeder Breaker NB0211 Control
14NEB11AB	3302	NB0211	C	5.2.18	Train B D/G Feeder Breaker NB0211 Control
14NEB11AC	3302	NB0211	C	5.2.18	Train B D/G Feeder Breaker NB0211 Control
14NEB11AD	3302	NB0211	C	5.2.18	Train B D/G Feeder Breaker NB0211 Control
14NEB11AG	3302	NB0211	C	5.2.18	Train B D/G Feeder Breaker NB0211 Control
14NEB11AJ	3302	NB0211	C	5.2.18	Train B D/G Feeder Breaker NB0211 Control
14NEK13AA	3302	NE0106	P	5.2.18	Train B D/G Exciter Control Power

Table C-10-4
PFSSD Cables Located in Fire Area C-10

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NEK13AD	3302	NE0106	C	5.2.18	Train B D/G Exciter
14NEK13AJ	3302	NE0106	I	5.2.18	Train B D/G Exciter
14NFK01CA	3302	NF039A	C	5.2.1	Load Shedder / Emergency Load Sequencer
14NFK01DA	3302	NF039B	C	5.2.1	Load Shedder / Emergency Load Sequencer
14NFY01EA	3302	NF039A	C	5.2.1	Load Shedder / Emergency Load Sequencer
14NFY01FA	3302	NF039B	C	5.2.1	Load Shedder / Emergency Load Sequencer
14NGB10AA	3302	NG02	C	5.1.11	Breaker NB0213 to XNG02 Control
14NGB10AB	3302	NG02	C	5.1.11	Breaker NB0213 to XNG02 Control
14NGB10BA	3302	NG04	C	5.1.13	Breaker NB0210 to XNG04 Control
14NGB10BB	3302	NG04	C	5.1.13	Breaker NB0210 to XNG04 Control
14NGB10SA	3302	NG06	C	5.1.8	Breaker NB0216 to XNG06 Control
14NGB10SB	3302	NG06	C	5.1.8	Breaker NB0216 to XNG06 Control
14NGG01AA	3302	XNG02	P	5.1.11	Breaker NB0213 to XNG02 Power
14NGG01AB	3302	NG02A	P	5.1.12	Breaker NG0206 to NG02ABF5
14NGG01AC	3302	NG02A	P	5.1.12	Breaker NG0206 to NG02ABF5
14NGG01AD	3302	NG02B	P	5.1.11	Breaker NG0207 to NG02BAF1
14NGG01AE	3302	NG02B	P	5.1.11	Breaker NG0207 to NG02BAF1
14NGG01AJ	3302	SGN01B	P	5.1.11	Containment Cooler Pump B
14NGG01BA	3302	XNG04	P	5.1.13	Breaker NB0210 to XNG04 Power
14NGG01BB	3302	NG04C	P	5.1.13	Breaker NG0406 to NG04CMF1
14NGG01BC	3302	NG04C	P	5.1.13	Breaker NG0406 to NG04CMF1
14NGG01BD	3302	NG04D	P	5.1.13	Breaker NG0407 to NG04DAF1
14NGG01BE	3302	NG04D	P	5.1.13	Breaker NG0407 to NG04DAF1

Table C-10-4
PFSSD Cables Located in Fire Area C-10

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NGG01BF	3302	SGN01D	P	5.1.13	Containment Cooler Pump D
14NGG01SA	3302	XNG06	P	5.1.8	Breaker NB0216 to XNG06 Power
14NGG11AA	3302	NG0201	C	5.1.11	Breaker NG0201 Control Power
14NGG11AC	3302	NG0201	C	5.1.11	Breaker NG0201 Control Power
14NGG11BA	3302	NG0401	C	5.1.13	Breaker NG0401 Control Power
14NGG11BC	3302	NG0401	C	5.1.13	Breaker NG0401 Control Power
14NGK11AA	3302	NG02	P	5.1.11	Bus NG02 125 VDC Breaker Control Power
14NGK11AB	3302	NG02	P	5.1.11	Bus NG02 125 VDC Breaker Control Power
14NGK11BA	3302	NG04	P	5.1.13	Bus NG04 125 VDC Breaker Control Power
14NGK11BB	3302	NG04	P	5.1.13	Bus NG04 125 VDC Breaker Control Power
14NGY13BA	3302	NG100B	P	5.2.23	CVCS Heat Tracing Isolation Fuses
14NKG10BA	3302	NK22	P	5.1.14	480 VAC Power to Battery Charger NK22
14NKG10DA	3302	NK24	P	5.1.14	480 VAC Power to Battery Charger NK24
14NKG10FA	3302	NK26	P	5.1.14	480 VAC Power to Battery Charger NK26
14NKG10FB	3302	NK26	P	5.1.14	480 VAC Power to Battery Charger NK26
14NKK02A1	3302	NK26	P	5.1.14	+125 VDC from NK76 to NK74
14NKK02A2	3302	NK26	P	5.1.14	-125 VDC from NK76 to NK74
14NKK02A3	3302	NK26	P	5.1.14	+125 VDC from NK26 to NK76
14NKK02A4	3302	NK26	P	5.1.14	-125 VDC from NK26 to NK76
14NKK10FB	3302	NK26	C	5.1.14	NG0411 Breaker Control Power
14NKY12BA	3302	NK26	C	5.1.14	Swing Charger Transfer Switch Control
14NKY12BD	3302	NK26	C	5.1.14	Swing Charger Transfer Switch Control
14NKY12BE	3302	NK26	P	5.1.14	Swing Charger Transfer Switch Control

Table C-10-4
PFSSD Cables Located in Fire Area C-10

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NKY12DA	3302	NK26	P	5.1.14	Swing Charger Transfer Switch Control
14NKY12DB	3302	NK26	P	5.1.14	Swing Charger Transfer Switch Control
14NNG01AA	3302	NN14	P	5.2.19	480 VAC Power to Inverter NN14
14NNG01BA	3302	NN12	P	5.2.19	480 VAC Power to Inverter NN12
14NNG01CA	3302	NN16	P	5.2.19	480 VAC Power to Inverter NN16
14NNK01MA	3302	NN16	P	5.2.19	125 VDC Power to Swing Inverter NN16
14NNK01MB	3302	NN16	P	5.2.19	125 VDC Power to Swing Inverter NN16
14NNK01MC	3302	NN16	P	5.2.19	125 VDC Power to Swing Inverter NN16
14NNK01MD	3302	NN16	P	5.2.19	125 VDC Power to Swing Inverter NN16
14NNY01HA	3302	NN14	P	5.2.19	120 VAC Pwr to NN14 from Swing Inv NN16
14NNY01HB	3302	NN14	P	5.2.19	120 VAC Pwr to NN14 from Swing Inv NN16
14PKK11AA	3302	PK22	C	5.1.13	NG0409 Breaker Control
14PNG01AD	3302	PN08	P	5.2.20	Non-Class 1E Electrical Equipment AC Distribution Panel
14PNG01AE	3302	PN08	P	5.2.20	Non-Class 1E Electrical Equipment AC Distribution Panel
14RPK09BA	3302	RP140	P	5.1.15	125 VDC Power to RP140
14RPK09NA	3302	RP335	P	5.1.6	125 VDC Power to RP335
14RPK15BA	3302	86XRP5	C	5.1.6	Control room lockout relay
14RPK15CA	3302	86XRP6	C	5.1.6	Control room lockout relay
14RPK15DA	3302	86XRP7	C	5.1.6	Control room lockout relay
14RPY09AA	3302	RP140	P	5.1.15	120 VAC Power to RP140
14RPY09GA	3302	RP147B	P	5.1.16	120 VAC Power to RP147B

Table C-10-4
PFSSD Cables Located in Fire Area C-10

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14RPY10BA	3302	CGD01B	C	5.1.7	120 VAC Power Feed to RP068
14SBS16AA	3302	BBTI0423X	I	5.1.5	RCS Cold Leg Loop 2 Temperature
14SBS16BA	3302	AELI0504A	I	5.1.5	Steam Generator D Wide Range Water Level
14SBS16EA	3302	BBTI0443A	I	5.1.5	RCS Loop 4 Hot Leg Temperature
14SBS16NA	3302	BBPI0406X	I	5.1.5	RCS Pressure
14SBS16XA	3302	AELI0502A	I	5.1.5	Steam Generator B Wide Range Water Level
14SBS16YA	3302	AELI0504A	I	5.1.5	Steam Generator D Wide Range Water Level
14SBS16ZA	3302	BBLI0460B	I	5.1.5	Pressurizer Level Narrow Range
14SBY09HA	3302	SB148A/B	P	5.1.5	120 VAC Power to SB148A/B
16FCY35AA	3302	FC170A	P	5.1.17	Steam Generator Feed Pump B Term Cabinet
16NBA10AB	3302	XNB01	C	5.2.21	Train A ESF Transformer
16NBA11AC	3302	PA0201	C	5.1.9	XNB02 Feeder Breaker
16NBA11AE	3302	PA0201	C	5.1.9	XNB02 Feeder Breaker
16NBB03AB	3302	NB0212	C	5.2.22	XNB01 to NB02 Differential Protective Relay
16NBB05AA	3302	NB02	P	5.1.8	Main Power Feed from XNB02 to NB02
16NBB05AB	3302	NB02	P	5.1.8	Main Power Feed from XNB02 to NB02
16NBB05AC	3302	NB02	P	5.1.8	Main Power Feed from XNB02 to NB02
16NBB05AD	3302	NB02	C	5.2.22	XNB02 Differential Relay
16NBB05AL	3302	NB02	C	5.2.22	XNB02 Differential Relay
16PKG11BA	3302	PK22	P	5.1.13	480 VAC Power to Non-Class 1E Battery Charger PK22 from NG0409
16PKG13AA	3302	PK24	P	5.1.13	480 VAC Power to Non-Class 1E Battery Charger PK24 from NG0410

5.2.1 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus. This will, in turn, initiate an undervoltage condition and actuate the load shedder/sequencer and send a signal to start the associated diesel generator.

Cables associated with all four UV relays on NB02 and two of four UV relays on NB01 are run in area C-10. In addition, cables associated with all four PTs on NB02 and two of four PTs on NB01 are run in area C-10. Damage to these cables could provide a false undervoltage/degraded voltage condition on both safegaurds buses and actuate the signals described in the previous paragraph. A spurious start of the Train A diesel generator will not adversely impact PFSSD since an operating Train A diesel generator is the desired condition for a fire in area C-10.

A fire in area C-10 involving cables associated with the under voltage/degraded voltage signals will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-11NB01, E-11NB02, E-12NF01, E-13NF01, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, E-1F9402A, E-1F9402B, E-1F9403, E-1F9425, E-1F9426

5.2.2 Auxiliary Feedwater

Power and control cables associated with Train B Motor Driven Auxiliary Feedwater Pump (MDAFP) are run through area C-10. Damage to these cables could prevent operation of the pump. As stated earlier, the Turbine Driven Auxiliary Feedwater Pump (TDAFP) may also be unavailable if a fire occurs in area C-10.

Power and control cables for redundant Train A MDAFP are run in a separate fire area and are unaffected by a fire in area C-10. Therefore, PFSSD is assured using Train A MDAFP if a fire occurs in area C-10.

Cable 14GFG01BC is associated with the automatic start circuit on the Train B AFWP room cooler SGF02B. Upon start of the Train B AFWP, the contact associated with this circuit will close and the room cooler will start, as long as the hand switch is in the auto position. Damage to the cable due to a fire will either spuriously start the cooler or prevent it from automatically starting.

Circuits associated with Train A AFWP room cooler SGF02A do not run through area C-10 and are unaffected by the fire. Therefore, PFSSD is assured using Train A Motor Driven AFWP to provide auxiliary feedwater to steam generators B and C if a fire occurs in area C-10.

References: XX-E-013, E-15000, E-13AL01B, E-13GF01, E-13NB04

5.2.3 TDAFP to Steam Generator B Supply Valve ALHV0010

Valve ALHV0010 provides isolation and control of auxiliary feedwater flow from the Turbine Driven Auxiliary Feedwater Pump (TDAFP) to steam generator B. Instrument cables associated with this valve are run to panel RP147B in area C-10. Damage to these cables due to a fire could prevent operation of the valve which would prevent auxiliary feedwater flow from the TDAFP to the B steam generator.

A fire in area C-10 has the potential to cause a loss of the TDAFP and the Train B Motor Driven Auxiliary Feedwater Pump (MDAFP). The Train A MDAFP is available to supply auxiliary feedwater to steam generators B and C. Therefore, damage to the cables associated with valve ALHV0010 will not adversely impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-13AL05B

5.2.4 Centrifugal Charging Pumps

At least one centrifugal charging pump (CCP) is required for PFSSD to provide RCP seal cooling, reactivity control and inventory control. These functions are accomplished using a CCP taking suction from the refuelling water storage tank (RWST) and injecting through the RCP seals. RCP seal injection provides approximately 20 gpm makeup to the RCS and provides adequate boron concentration to maintain sub-critical reactivity conditions. If RCP seal injection is unavailable, reactivity and inventory control is provided by lining up the CCPs to the boron injection tank (BIT). The normal charging pump (NCP) is not credited and is assumed lost.

Power and control cables associated with Train B Centrifugal Charging Pump (CCP) are run through area C-10. Damage to these cables could prevent operation of the pump. Redundant Train A CCP cables are run in a separate fire area and are unaffected by a fire. Therefore, PFSSD is assured using Train A CCP if a fire occurs in area C-10.

Power and control cables associated with Train B charging pump miniflow valve BGHV8111 are run through area C-10. Redundant Train A cables for miniflow valve BGHV8110 are run in a different area and are unaffected by a fire in area C-10. Therefore, PFSSD is assured using Train A CCP miniflow valve if a fire occurs in area C-10.

Power and control cables associated with Train B CCP room cooler SGL12B are run in area C-10. Damage to these cables will prevent operation of the room cooler. Train A CCP room cooler SGL12A circuits do not run in area C-10 and are unaffected by a fire. Therefore, Train A CCP room cooler will be available.

Based on the above discussion, the Train B CCP could be affected but the Train A CCP is available if a fire occurs in area C-10.

References: XX-E-013, E-15000, E-13BG01A, E-13BG11B, E-13GL05, E-13NB04

5.2.5 Reactor Coolant Pump Seal Injection

PFSSD requires RCP seal injection to provide a boron injection path, provide makeup to the RCS and provide cooling to the RCP seals. The redundant boron injection and makeup path is through the boron injection tank (BIT). The redundant seal cooling method uses thermal barrrier cooling.

Power and control cables associated with RCP seal injection flow throttling valve BGHV8357B are run in area C-10. Damage to these cables will prevent operation of the valve from the control room. Cables associated with redundant Train A valve BGHV8357A are run in a separate fire area and are unaffected by a fire in area C-10.

Based on the above discussion, PFSSD is assured using Train A charging pump and aligning RCP seal injection flow through BGHV8357A.

References: XX-E-013, E-15000, E-13BG52, M-12BG03

5.2.6 RWST To Charging Pump A Isolation Valve (BNLCV0112E)

Power and control cables associated with normally closed valve BNLCV0112E are run in area C-10. Damage to these cables will prevent operation of the valve from the control room. PFSSD requires suction from the RWST to the operating charging pump. Cables associated with redundant Train A valve BNLCV0112D are run in a separate fire area and are unaffected by a fire in area C-10.

Based on the above, PFSSD is assured using Train A charging pump and aligning suction through BNLCV0112D. Therefore, the configuration is acceptable.

References: XX-E-013, E-15000, E-13BN01

5.2.7 Essential Service Water Pumps and Associated Components

Either the Train A or the Train B essential service water (ESW) system is required to be available to ensure PFSSD. The ESW system supplies water to the following PFSSD components on the associated train:

- CCP room cooler
- RHR pump room cooler
- Class 1E switchgear room A/C condenser
- diesel generator engine cooling
- control room A/C condenser
- auxiliary feedwater pump room cooler
- motor and turbine driven auxiliary feedwater pump suction (backup to CST)
- containment air coolers
- electrical penetration room cooler
- component cooling water pump room cooler
- component cooling water heat exchanger
- component cooling water system makeup

Power and control cables associated with ESW pump B are run in area C-10. Damage to these cables will prevent the pump from operating. Cables associated with redundant Train A ESW pump PEF01A are run in a separate fire area and are unaffected by a fire in area C-10.

Cable 14EFG02SD is a control cable that provides an automatic start signal to the Train B ESW traveling water screen when the Train B ESW pump runs. An intra-cable short between the two conductors in this cable will start the screen in the absence of a running pump. If this

occurs, operators can stop the screen using EFHIS0004 in the control room. An open in this cable will prevent the automatic start of the screen but operators can start it using EFHIS0004 in the control room. A short to ground would blow the CPT secondary side fuse and drop power to the control circuit, preventing the screen from operating. As stated in the previous paragraph, Train B ESW pump may not be available due to a fire in area C-10 but Train A ESW pump is available. Circuits for Train A traveling water screen do not run through area C-10.

Cable 14EFG03SD is a control cable associated with ESW Train B screen wash water valve EFHV0092. Damage to this cable could prevent operation of the valve. As stated above, Train B ESW pump may not be available due to a fire in area C-10 but Train A ESW pump is available. Circuits for Train A screen wash water valve EFHV0091 do not run through area C-10.

Cables 14EFG06SD and 14EFG06SE are associated with Train B ESW pump air release valve EFHV0098. Cable 14EFY10DA is a control cable associated with the air release valve time delay relay. The air release valve purges air from the pump casing upon pump start to ensure pump operability. The time delay relay closes the air release valve after 15 seconds of ESW pump operation. Circuits for Train A ESW pump air release valve EFHV0097 do not run through area C-10 and are unaffected by the fire.

Cable 14EFK01SA is a control cable associated with the local start and stop switch for Train B ESW pump motor DPEF01B. Cable damage due to a fire could bypass local hand switch EFHIS0056B, located on control panel EF156, and spuriously start the Train B ESW pump. This would not adversely impact PFSSD due to the continued availability of the Train A ESW pump.

Based on the above discussion, Train B ESW may be affected by a fire in area C-10. PFSSD is assured for a fire in area C-10 using Train A ESW pump PEF01A and associated components.

References: XX-E-013, E-15000, E-K3EF01A, E-K3EF02, E-K3EF03, E-K3EF06, E-K3EF10, E-K3GD01A, J-201-00133

5.2.8 ESW To Service Water and UHS Isolation Valves

The Essential Service Water (ESW) system supplies water to various PFSSD components on the associated train. In order to ensure proper flow of ESW to the supplied loads, valves in the system need to be in the proper lineup.

Valve EFHV0025 is a normally open isolation valve on the service water system feed to the Train A Essential Service Water System. Either this valve or valve EFHV0023 is required to be closed when operating the Train A ESW system for PFSSD. Power and control cables associated with EFHV0025 are run in this area. Damage to these cables could prevent closing EFHV0025 from the control room. Redundant valve EFHV0023 is unaffected by a fire in area C-10 and can be closed from the control room to isolate this flowpath. In addition, check valve EFV0470 is installed in this line and will prevent flow diversion in the unlikely event valve EFHV0023 cannot be closed.

Valve EFHV0026 is a normally open isolation valve on the service water system feed to the Train B Essential Service Water System. Either this valve or valve EFHV0024 is required to be closed when operating the Train B ESW system for PFSSD. Hand switch EFHS0026A is used to close the valve and isolate the circuit if a fire occurs in the control room. Power and control cables associated with EFHV0026 are run in this area. Damage to these cables could prevent closing EFHV0026 from the control room. Redundant valve EFHV0024 is unaffected by a fire in area C-10 and can be closed from the control room to isolate this flowpath. In addition,

check valve EFV0471 is installed in this line and will prevent flow diversion in the unlikely event valve EFHV0024 cannot be closed.

Valve EFHV0038 is an isolation valve on the return line from Train B ESW to the UHS. Hand switch EFHS0038A provides a means of isolating valve EFHV0038 from the control room and allows manual closure of the valve from the MCC. The switch is used in OFN RP-017 in response to a fire in the control room. Valve EFHV0038 is required to be open when operating the Train B ESW system. Cables associated with valve EFHV0038 are run in this fire area. Damage to these cables or the hand switch could cause spurious closure of the valve. If this occurs, Train A ESW is available to ensure safe shutdown.

Valve EFHV0039 is a normally open isolation valve on the return line from the Train A Essential Service Water System to the service water system. Either this valve or valve EFHV0041 is required to be closed when operating the Train A ESW system for PFSSD. Power and control cables associated with EFHV0039 are run in this area. Damage to these cables could prevent closing EFHV0039 from the control room. Redundant valve EFHV0041 is unaffected by a fire in area C-10 and can be closed from the control room to isolate this flowpath.

Valve EFHV0040 is a normally open isolation valve on the return line from the Train B Essential Service Water System to the service water system. Either this valve or valve EFHV0042 is required to be closed when operating the Train B ESW system for PFSSD. Power and control cables associated with EFHV0040 are run in this area. Damage to these cables could prevent closing EFHV0040 from the control room. Redundant valve EFHV0042 is unaffected by a fire in area C-10 and can be closed from the control room to isolate this flowpath.

References: XX-E-013, E-15000, E-13EF02, E-13EF02A, E-13EF03, E-13EF06A, E-1F9402A, E-1F9402B, E-1F9403

5.2.9 Component Cooling Water

For PFSSD, the component cooling water (CCW) system is used to provide cooling to the centrifugal charging pump (CCP) oil cooler, seal water heat exchanger, RHR heat exchangers and RHR pump seal coolers. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Power and control cables associated with Train B CCW pump motors DPEG01B and DPEG01D are run through area C-10. Damage to these cables could prevent operation of either pump or could cause the spurious operation of either or both pumps. Power to these pumps are supplied by 4.16 kV bus NB02. Spurious operation or maloperation of the Train B CCW pumps will not impact the ability to achieve and maintain PFSSD

Cable 14GLG06BD is associated with the automatic start circuit for the Train B CCW pump room cooler SGL11B. With hand switch GLHIS0023 in AUTO position, operation of either Train B CCW pump will close a contact in this circuit and start the room cooler. Damage to this cable due to a fire will either spuriously start the room cooler, prevent it from starting or blow the CPT secondary side fuse and drop power to the control circuit. In either case, Train A CCW room cooler SGL11A is unaffected by a fire in area C-10.

Cable 14EGG05DD, associated with Train B CCW valve EGHV0054, is run in this area. This cable supplies power to auxiliary relay 3XEG10 which provides permissives to open or close valves in the CCW supply to and from the Radwaste building. If Train B CCW is operating at the time of the fire, valve EGHV0054 will be open. Damage to cable 14EGG05DD could cause the control power fuse to blow and prevent closure of EGHV0054 when lining up Train A CCW. A loss of power to NB02, which is possible if a fire occurs in this area, could also prevent

closure of valves EGHV0016 and EGHV0054. Operation of Train A CCW with valves EGHV0016 and EGHV0054 open could cause Train A CCW flow to divert to Train B CCW system. Per calculation M-EG-24, the system will continue to operate with no damage to the pumps if the valves in the opposite train are open.

Based on the above discussion, Train B CCW could be affected by a fire in this area but Train A CCW is available.

References: XX-E-013, E-15000, E-13EG01C, E-13EG01D, E-13EG05D, E-13GL06, E-13NB05, Calculation M-EG-24

5.2.10 Residual Heat Removal System

Power and control cables associated with Train B RHR pump motor DPEJ01B are run through area C-10. Damage to these cables could prevent operation or cause spurious operation of the pump. Power to this pump is supplied by 4.16 kV bus NB02. As stated earlier, bus NB02 can be de-energized if a fire occurs in area C-10, however the Train B diesel generator may start and re-energize NB02. If the Train B RHR pump operates, PFSSD is assured since power and control cables associated with Train A RHR pump motor DPEJ01A are not run through area C-10 and will be unaffected by the fire.

Power and control cables for Train B RHR pump discharge valve EJHV8804B to the safety injection pumps runs through area C-10. This valve is required to be closed when operating the Train B RHR system for PFSSD to prevent inventory loss from the RCS. Since the B Train RHR pump could be unavailable, the position of this valve (open or closed) will have no adverse impact on PFSSD because the Train A RHR system is available if a fire occurs in area C-10.

Power and control cables associated with Train B RHR pump miniflow valve EJFCV0611 are run in area C-10. Damage to these cables could prevent operation of the valve and cause damage to the Train B RHR pump, if it is operating. Train A RHR miniflow valve EJFCV0610 is unaffected by a fire in area C-10.

Power and control cables associated with Train B RHR pump room cooler SGL10B are run in area C-10. Damage to these cables will prevent operation of the room cooler. Train A RHR room cooler SGL10A circuits do not run in area C-10 and are unaffected by a fire. Therefore, Train A RHR room cooler will be available.

Train A RHR pump PEJ01A and associated components are unaffected by a fire in area C-10 and will be used to provide decay heat removal during cold shutdown. Therefore, PFSSD is assured using Train A RHR system if a fire occurs in area C-10.

References: XX-E-013, E-15000, E-13EJ01, E-13EJ04B, E-13EJ08, E-13EJ08A, E-13GL05, E-13NB04

5.2.11 Safety Injection (SI) Pumps

The preferred PFSSD condition of the SI pumps is off. Therefore, a spurious start of the SI pumps should be avoided or mitigated. A control cable (14EMB01BB) associated with the Train B SI pump PEM01B runs through area C-10 and could cause the spurious start of the pump. The cable damage could prevent stopping the pump from the control room.

The pump is powered from the 4.16 kV bus NB02. As stated earlier, the NB02 bus can be de-energized, except that a spurious start of the Train B diesel generator may occur. In addition, breaker NB0211 could spuriously close due to damage to control cables associated with

breaker NB0211, which would re-energize the bus and provide power to the Train B SI pump motor.

If the Train B SI pump spuriously starts with the reactor at normal pressure, PFSSD will be assured. The pump will not discharge into the RCS due to the pressure differential between the RCS (2,235 psig) and the SI pump shutoff pressure (1,565 psig). In addition, the setpoint of the discharge relief valve (EM8853B) to the Recycle Holdup Tank is 1,825 psig. Therefore, no inventory is lost from the RWST. With the SI pump operating with no flow, damage to the pump could occur which is a commercial concern since the SI pump is not credited in the PFSSD analysis. Based on a review of the cable routing in E-15000, valve EMHV8814B is unaffected by the fire and would likely remain open to ensure an operable return flow path to the RWST. Maintaining this valve open ensures minimum flow across the pump to prevent damage due to cavitation. Since the position of EMHV8814B does not affect PFSSD, it is not credited as a PFSSD component.

Based on the above discussion, spurious operation of the Train B SI pump will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13EM01, E-13NB04

5.2.12 Containment Spray (CS) Pumps

Spurious start of the CS pumps may complicate PFSSD due to the possible depletion of inventory in the RWST. Therefore, a spurious start of the CS pumps should be avoided or mitigated. A control cable (14ENB01BB) associated with the Train B CS pump PEN01B runs through area C-10 and could cause the spurious start of the pump. The cable damage could prevent stopping the pump from the control room.

The pump is powered from the 4.16 kV bus NB02. As stated earlier, the NB02 bus can be de-energized, except that a spurious start of the Train B diesel generator may occur. In addition, breaker NB0211 could spuriously close due to damage to control cables associated with breaker NB0211, which would re-energize the bus and provide power to the Train B CS pump motor.

If the Train B CS pump spuriously starts, normally closed valve ENHV0012 will remain closed, since a spurious containment spray actuation signal (CSAS) is not credible for a fire in area C-10. In addition, cables associated with valve ENHV0012 do not run in area C-10. Therefore, if the CS pump operates, inventory will not be lost from the RWST.

References: XX-E-013, E-15000, E-13EN01, E-13NB04

5.2.13 Control Room A/C Units

Cable 14GKG02BA is the SGK04B 480 VAC power cable from Load Center NG0205 to power and control panel GK199C. Damage to this cable due to a fire could prevent operation of Train B Control Room A/C unit SGK04B. Circuits for Train A Control Room A/C unit SGK04A do not run through area C-10 and are unaffected by a fire.

Power and control cables associated with Train B Control Room A/C unit supply and return dampers GKHZ0040A and GKHZ0040B are run in area C-10. Damage to these cables could prevent operation of the associated dampers. Circuits for Train A Control Room A/C unit dampers do not run in area C-10.

Based on the above discussion, Control Room environmental conditions will be unaffected by a fire in area C-10.

References: XX-E-013, E-15000, E-13GK02C, E-13GK02D

5.2.14 Class 1E Electrical Equipment Room A/C Unit

Power and control cables associated with Train B Class 1E Electrical Equipment room A/C unit SGK05B are run in area C-10. A fire could damage these circuits and prevent operation of the unit. Circuits for Train A Class 1E Electrical Equipment A/C unit SGK05A do not run in area C-10. Train A equipment is primarily used if a fire occurs in area C-10.

Based on the above discussion, Train B class 1E equipment room cooling is available and is unaffected by a fire in area C-9.

References: XX-E-013, E-15000, E-13GK13A

5.2.15 Train B Diesel Generator Room Ventilation

Diesel generator room ventilation is required to ensure a suitable environment for operation of the diesel engine and associated equipment. In addition, diesel generator room ventilation is required to provide combustion air to the diesel engine.

Control cables associated with Train B diesel generator room exhaust damper GMHZ0019 are run in area C-10. The damper is maintained closed by an energized 125 VDC solenoid, and opens upon loss of power to the solenoid. Loss of power to the circuit due to cable damage will cause the damper to fail open, which is the desired PFSSD position when operating the Train B diesel generator. A hot short could maintain power to the solenoid and prevent automatic opening of the damper when the diesel runs or the supply fan operates.

Cable 14GMI02CA is associated with Train B diesel generator room temperature element GMTE0011. Cable 14GMI02CB is associated with Train B diesel generator room inlet damper GMTZ0011A. Cable 14GMI02CC is associated with Train B diesel generator room recirculation damper GMTZ0011B. Damage to these cables could prevent proper operation of the ventilation system. The Train A diesel generator room ventilation system is unaffected by a fire in this area.

Cable 14GMG01BH is associated with control room isolation switch GMHS0011B for ventilation supply fan DCGM01B. Damage to the cable could prevent operation of the fan.

Temperature switch GMTSL0011 is located in panel RP147B. The temperature switch contact opens on low room temperature and prevents operation of supply fan DCGM01B. Damage to cable 14GMG01BK or this temperature switch could prevent operation of the supply fan. Train A diesel generator room supply fan DCGM01A is unaffected by a fire in area C-10.

Based on the above discussion, the Train B emergency diesel generator room ventilation system could be affected by a fire in area C-10. The Train A emergency diesel generator room ventilation system is unaffected.

References: XX-E-013, E-15000, E-13GM01A, E-13GM02, E-13GM04, E-13GM04A

5.2.16 Train B Emergency Fuel Oil Transfer Pump PJE01B

Control cables associated with the Train B emergency fuel oil transfer pump are run in area C-10. Damage to these cables due to a fire could cause a hot short that would spuriously start the transfer pump. The hot short could bypass the high day tank level contact, which would prevent automatic shutdown of the transfer pump. If this occurs, diesel fuel could continuously be pumped from the underground storage tank into the day tank. The day tank overflow will direct the fuel back to the underground storage tank and is capable of handling full flow from the transfer pump, even with the diesel generator not operating.

Based on the piping configuration of the day tank vent and overflow, it is unlikely that fuel oil will be pumped through the outside vent opening. However, if this does occur, PFSSD is assured due to the 100% capacity Train A diesel generator storage tank. Splling diesel fuel on the ground only poses an environmental concern, not a PFSSD concern.

Damage to the cables could also prevent operation of the transfer pump. The EDG can only operate for approximately 1 hour fully loaded on the contents of the day tank. Loss of the transfer pump would prevent continuous operation of the Train B EDG.

A fire in area C-10 credits Train A components using the Train A EDG. Off-site power to NB01 could be lost. Loss of the Train B EDG due to a fire in this area will not affect PFSSD.

References: XX-E-013, E-15000, E-13JE01, E-13JE01A, E-13JE02, E-13JE04, M-10JE, M-12JE01

5.2.17 Train B Emergency Diesel Generator

Power and control cables associated with Train B diesel generator control panel KJ122 are run in area C-10. Damage to these cables could prevent operation of the diesel generator. As stated throughout this evaluation, several Train B components are affected by a fire in area C-10, however redundant Train A components, including the Train A diesel generator, are available. Cables associated with Train A diesel generator control panel KJ121 do not run in area C-10.

Cable 14KJK07AE is associated with the Train B emergency diesel generator governor control. Damage to this cable could prevent operation or cause maloperation of the Train B diesel generator. The Train A diesel generator governor controls are located in a separate fire area and are unaffected by the fire.

References: XX-E-013, E-15000, E-13KJ03A

5.2.18 Standby Diesel Generator Power Availability

Several cables associated with Train B diesel generator power and control are run in area C-10. Damage to these cables could prevent the Train B diesel generator from automatically or manually lining up to supply power to NB02. Train A diesel generator power and control circuits do not run in area C-10 and are unaffected by the fire.

References: XX-E-013, E-15000, E-13NE02, E-13NE11, E-13NE13

5.2.19 Class 1E 120 VAC Electrical Distribution System

The Class 1E 120 VAC electrical distribution system provides power to vital instrumentation and control loads for shutdown and normal operation. Under normal conditions, the system is supplied by inverters connected to the 125 VDC NK battery system. Swing inverters allow the primary inverters to be taken out of service for maintainance or repair without disrupting power to the associated vital AC bus. In the event of a loss of power to the inverters, a backup source of power is automatically lined up. The backup power source originates from the 480 VAC electrical distribution system (NG).

Cable 14NNG01AA supplies 480 VAC power from NG0~~0~~2AFF3 to inverter NN14. Cable 14NNG01BA supplies 480 VAC power from NG02ABR1 to inverter NN12. Cable 14NNG01CA supplies 480 VAC power from NG02AFF1 to swing inverter NN16. Damage to these cables will disrupt the 480 VAC power source to Inverters NN12, NN14 and NN16.

Cables 14NNK01MA and 14NNK01MB supply 125 VDC power from NK0403 to manual transfer switch NK80. Cables 12NNK01LA and 12NNK01LB supply 125 VDC power from NK0203 to manual transfer switch NK80. Cables 14NNK01MC and 14NNK01MD supply 125 VDC power from manual transfer switch NK80 to swing inverter NN16. Damage to these cables will disrupt the 125 VDC power supply to swing inverter NN16.

Cables 12NNY01GA and 12NNY01GB supply 120 VAC power from swing inverter NN16 to bus NN02 through a manual transfer switch in inverter NN12. Cables 14NNY01HA and 14NNY01HB supply 120 VAC power from swing inverter NN16 to bus NN04 through a manual transfer switch in inverter NN14. Damage to these cables will disrupt the 120 VAC power supply from swing inverter NN16 to the associated 120 VAC distribution panel.

Inverters NN12 and NN14 and 120 VAC vital distribution buses NN02 and NN04 are located in a separate fire area and are unaffected by a fire in area C-10. The 125 VDC power supply to inverters NN12 and NN14 is unaffected by a fire in area C-10. However, as stated in other sections (5.1.11, 5.1.13, 5.1.14), a fire in area C-10 could cause a loss of 480 VAC power to the Train B NK battery chargers (NK22, NK24 and NK26) which will cause a loss of normal power to the NK02 and NK04 125 VDC busses. Batteries NK12 and NK14 are unaffected and can supply 125 VDC to busses NK02 and NK04 to provide power to inverters NN12 and NN14 for a limited time.

Train A vital 120 VAC distribution panels NN01 and NN03 are unaffected by a fire in area C-10. Therefore, in the event of a loss of Train B Class 1E 120 VAC electrical distribution system, the Train A Class 1E electrical distribution switchboards are available to supply redundant PFSSD loads.

Based on the above discussion, damage to cables and components associated with Train B vital 120 VAC distribution panels NN02 and NN04 will not adversely impact the ability to achieve and maintain safe shutdown in the event of a fire in area C-10.

References: XX-E-013, E-15000, E-13NN01

5.2.20 Non-Class 1E 120 VAC Electrical Distribution System

The PFSSD function of the non-Class 1E 120 VAC electrical distribution system is to supply 120 VAC power to Main Control Boards RL017/RL018 and RL021/RL022. The power is split at each MCB to supply specific PFSSD components.

The PFSSD components that depend on 120 VAC power from RL017/RL018 are Residual Heat Removal (RHR) discharge valves EJHCV0606 (Train A) and EJHCV0607 (Train B). Non-class 1E switchboard panel PN07 supplies power from switch PN0736 to valve positioner EJHY0606. Valve positioner EJHY0606 controls the position of EJHCV0606 using hand controller EJHIC0606. Non-class 1E switchboard panel PN08 supplies power from switch PN0833 to valve positioner EJHY0607. Valve positioner EJHY0607 controls the position of EJHCV0607 using hand controller EJHIC0607.

The PFSSD components that depend on 120 VAC power from RL021/RL022 are temperature recorders BBTR0423, BBTR0433 and BBTR0443. Non-class 1E switchboard panel PN07 supplies power from switch PN0738 to temperature recorder BBTR0423. Non-class 1E switchboard panel PN08 supplies power from switch PN0835 to temperature recorders BBTR0433 and BBTR0443.

Cables 14PNG01AD and 14PNG01AE supply 480 VAC power from NG002BBF1 to 480/120V transformer XPN08A. Damage to either of these cables due to a fire in area C-10 will result in a loss of power to the transformer and loss of 120 VAC feed to PN08 from this power source.

A redundant source of power to PN08 exists. The redundant power feed originates from PG20GER5 (480 VAC) and supplies 480/120V transformer XPN08D. Transformer XPN08D supplies 120 VAC power to voltage regulator PN08A which then supplies the alternate source of power to PN08.

Cables associated with the alternate power feed to PN08, through transformer XPN08D, do not run in area C-10 and are unaffected by the fire. Therefore, PN08 remains available to energize its respective PFSSD loads.

Non-class 1E 120 VAC power to panel PN07 is unaffected by a fire in this area.

References: XX-E-013, E-15000, E-13PN01, E-13PN01A, E-1F9421

5.2.21 Engineered Safety Features (ESF) Transformer XNB01

Cable 16NBA10AB is associated with the automatic fault protection circuit for ESF transformer XNB01. Damage to this cable due to a fire in area C-10 could cause a spurious trip of switchyard breakers 13-8 and 13-48, which provide power to XNB01. Damage could also prevent automatic trip of the breakers in the event of a fault.

As discussed in Section 5.1.9, transformer XNB01 can be isolated using available hand switches in the control room. Loss of power to XNB01 will not adversely impact PFSSD since Train A diesel generator is available to supply bus NB01 and associated Train A PFSSD loads. Therefore, damage to this cable will not impact the ability to achieve and maintain safe shutdown in the event of a fire in area C-10.

References: XX-E-013, E-15000, E-13NB10

5.2.22 Train B Class 1E Equipment Bus NB02

Cable 16NBB03AB is associated with the differential protective relay 287/T1 that monitors the potential differential between the primary side of XNB01 and the secondary side at alternate feeder breaker NB0212. Damage to this cable due to a fire could cause a spurious differential signal. If XNB01 is being used to supply NB02 at the time of the fire, the feeder breaker to XNB01 may trip, causing a loss of power to NB01 and NB02.

Cables 16NBB05AD and 16NBB05AL are associated with the differential protective relay for XNB02. Damage to this cable due to a fire could cause a spurious differential current signal and trip the feeder breaker to XNB02.

Loss of power to XNB01 and XNB02 due to damage to the cables listed above will not adversely impact PFSSD due to the availability of the Train A diesel generator to supply power to NB01. Therefore, PFSSD can be achieved using Train A Class 1E equipment powered by the Train A emergency diesel generator.

References: XX-E-013, E-15000, E-13NB03, E-13NB05, E-13NB06, E-13NB11

5.2.23 CVCS Heat Tracing

Heat tracing has been installed to maintain the emergency borate line and other fluid lines above the solidification temperature in the Train A SI pump room. Both safety trains can power the heat tracing; an automatic transfer switch (QJS0001) switches from Train A (primary source) to Train B (alternate source) on loss of A Train.

Fire area C-10 contains one cable (14NGY13BA) associated with the CVCS heat tracing system. Damage to this cable will affect the secondary power feed to the heat tracing system but the primary power feed is unaffected. Therefore, CVCS heat tracing is not affected by a fire in this area.

References: E-15000, XX-E-013, E-13NG13, DCP 13130

FIRE AREA C-11

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-11 is located on the 2000 elevation of the Control Building and includes the room listed in Table C-11-1.

Table C-11-1
Rooms Located in Fire Area C-11

ROOM #	DESCRIPTION
3305	South Electrical Chase - 2000 Elevation

Fire area C-11 is protected with an automatic wet-pipe sprinkler system and automatic fire detection. The area is separated from adjacent areas by minimum 3-hour fire resistant construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-11-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-11-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-11

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Cables associated with S/G ARV ABPV0004 may be damaged, preventing control of this valve from the control room. The ARV can be isolated by closing air supply valve KAV1429 and nitrogen supply valve KAV1365, then bleeding air from the regulator but this action is not required for PFSSD.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
AE	Main Feedwater	H, P	Steam generator D wide range level indicator AELI0504 in the main control room (MCR) may be affected. Steam generators B and D wide range level indication at the auxiliary shutdown panel (ASP) may be affected. All four narrow range level indicators in the (MCR) are unaffected.
AL	Aux. Feedwater System	H, P	Train B motor driven auxiliary feedwater pump (MDAFP) may be affected. Train A MDAFP is available to supply auxiliary feedwater to SGs B and C. The turbine driven auxiliary feedwater pump will operate, but it may be limited to supplying only steam generators A, C and D. Steam generator D flow transmitter ALFT0001 may be affected. Steam generators A, B and C flow transmitters are unaffected. Valves ALHV0005 (MDAFP B to SG D) and ALHV0010 (TDAFP to SG B) may be affected. Valves from MDAFP A to SGs B and C and from the TDAFP to SGs A, C and D are unaffected. MDAFP B suction pressure transmitter ALPT0024 may be affected. MDAFP A suction pressure transmitter ALPT0025 is unaffected. TDAFP suction pressure transmitter ALPT0026 is unaffected.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
BB	Reactor Coolant System	R, M, H, P, S	Block valve BBHV8000B may fail to respond to a close signal. PORV BBPCV0456A is unaffected and will remain closed. RCS pressure transmitter BBPT0406 may be affected and pressure indicator BBPI0406 may not function. Pressure transmitter/indicator BBPT0405/BBPI0405 is unaffected. Pressurizer level indicator BBLI0460B located at the ASP may be affected. Pressurizer level indication in the MCR using BBLI0459A or BBLI0460A is unaffected. Reactor coolant pumps C and D may not stop using the control room hand switch. RCP seal injection and thermal barrier cooling remain available. Therefore, the inability to stop the RCPs will have no adverse impact on PFSSD.
BG	Chemical and Volume Control System	R, M, S	VCT outlet valve BGLCV0112C may not close in response to a control room signal or could spuriously close. Redundant valve BGLCV0112B is unaffected. Train B centrifugal charging pump (CCP) to RCP seal injection isolation valve BGHV8357B could be affected. The Train A RCP seal injection valve BGHV8357A is unaffected.

Table C-11-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-11

System	System Name	PFSSD Function*	Comments
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
BN	Borated Refueling Water Storage System	R, M, H	The Train B RWST to CCP suction valve BNLCV0112E may be affected. The Train A RWST to CCP suction valve BNLCV0112D is unaffected. RWST to Train B RHR pump valve BNHV8812B may be affected. RWST to Train A RHR pump valve BNHV8812A is unaffected.
EF	Essential Service Water System	H, S	Several Train B ESW valves and the Train B ESW pump may be affected. Train A ESW system is unaffected.
EG	Component Cooling Water System	S	Train B CCW pumps PEG01B and PEG01D may be affected. Train A CCW pumps PEG01A and PEG01C are unaffected.
EJ	Residual Heat Removal System	M, H, P	Several components in the Train B RHR system, including the Train B RHR pump, may be affected. The Train A RHR system is unaffected.
EM	High Pressure Coolant Injection	R, M	The Train B SI pump may spuriously start and may not be able to be stopped from the control room. Actual safety injection will not occur until the RCS pressure decreases below that of the pump shutoff pressure. The pump can be stopped, if necessary, by opening breaker NB0202, but this action is not required for PFSSD.
EN	Containment Spray	R, M	The Train B CS pump may spuriously start. Valve ENHV0012 will remain closed, preventing flow from the CS nozzles. The pump can be stopped, if necessary, by opening breaker NB0203, but this action is not required for PFSSD.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
FC	Auxiliary Turbines	R, H, P	Valve FCFV0105 may be affected. The MSIVs can be closed using all-close hand switches ABHS0079 or ABHS0080.
GD	ESW Pump House HVAC	S	Train B ESW pump room ventilation may be affected. Train A ESW pump room ventilation is unaffected.
GF	AFW Pump Room Coolers	S	Train B motor driven auxiliary feedwater pump room cooler SGF02B may be affected. Train A motor driven auxiliary feedwater pump room cooler SGF02A is unaffected.

Table C-11-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-11

System	System Name	PFSSD Function*	Comments
GK	Control Room and Class 1E Switchgear Room Coolers	S	Train B control room A/C unit SGK04B may be affected. Train A control room A/C unit SGK04A is unaffected. Train B Class 1E electrical equipment A/C unit SGK05B may be affected. Train A Class 1E electrical equipment A/C unit SGK05A is unaffected.
GL	Auxiliary Building HVAC	S	Train B RHR pump room cooler SGL10B may be affected. Train A RHR pump room cooler SGL10A is unaffected. Train B CCW pump room cooler SGL11B may be affected. Train A CCW pump room cooler SGL11A is unaffected. Train B CCP pump room cooler SGL12B may be affected. Train A CCP pump room cooler SGL12A is unaffected.
GM	Emergency Diesel Generator Room HVAC	S	Cables associated with Train B diesel generator room exhaust damper GMHZ0019 are run in this area. Train A diesel generator room ventilation is unaffected.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
JE	Diesel Fuel Oil	S	Train B emergency diesel fuel oil transfer pump DPJE01B may be affected. Level indication for the Train B fuel oil storage tank may be lost. Train A emergency diesel fuel oil transfer pump DPJE01A and Train A fuel oil storage tank level transmitter are unaffected.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
KJ	Standby Diesel Engine	S	Train B emergency diesel engine may not be available. The Train A emergency diesel engine is unaffected.
MA	Main Generation	S	A cable associated with phase differential relay 287/T1 in transformer protection relay panel MA104F could be affected. This could cause a loss of offsite power to NB01. Cables associated with MA104E are unaffected.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
NB	4.16 kV System	S	A loss of off-site power to NB01 and NB02 may occur. The Train A diesel generator is available to energize the NB01 bus if this occurs.

Table C-11-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-11

System	System Name	PFSSD Function*	Comments
NE	Standby Diesel Generator	S	Train B emergency diesel generator may not be available. The Train A emergency diesel generator is unaffected.
NF	Load Shed and Emergency Load Sequencing	S	Some cables associated with the load shedder/sequencer on both trains could be affected. However, damage to these cables will not prevent the equipment from performing its intended function.
NG	480V Load Centers and MCCs	S	A loss of offsite power to the Train A and B 480 Volt load centers may occur. The Train A diesel generator is available to energize the Train A load centers if this occurs.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
NN	120VAC	S	Train B Class 1E 120 VAC electrical distribution system may be affected. The Train A Class 1E 120 VAC electrical distribution switchboards are unaffected.
PA	13.8kV	S	Cables associated with PA0201 phase differential relay 287/T2 could be affected, causing a loss of off-site power to NB02. In addition, the Train B EDG may not be available. The Train A EDG is available to supply power to Train A PFSSD loads.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
PK	125VDC	S	Battery charger PK22 may be affected. Battery set PK12 will provide short-term 125 VDC power to PK02. Train A non-class 1E 125 VDC system is unaffected.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
PN	120VAC	S	The primary source of power to non-class 1E 120 VAC switchboard PN08 may be affected but the alternate source of power is unaffected. Both sources of power to non-class 1E 120 VAC switchboard PN07 are unaffected.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.

Table C-11-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-11

System	System Name	PFSSD Function*	Comments
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
RP	Miscellaneous Control Panels	R, M, H, P, S	Panel RP140 could lose Class 1E 125 VDC power from NK4415. This affects three relays associated with Train B ESW system. Train A ESW remains available. Panel RP335 could lose Class 1E 125 VDC power from NK4419. This affects control room lockout relays associated with Train B motor driven and turbine driven auxiliary feedwater. Train A motor driven auxiliary feedwater remains available. Train B 120 VAC power to control room panels RP147B and RP068 could be lost. Train A 120 VAC power remains available to supply redundant PFSSD loads.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
SB	Reactor Protection System	R, S	120 VAC power to cabinet SB148B could be lost. Loss of power to SB148B will result in a loss of capability to monitor AELT0504 and BBPT0406 from the ASP and the MCR. 120 VAC Power to SB148A is unaffected. A number of cables from SB148A and SB148B to the auxiliary shutdown panel (ASP) could be affected, causing a loss of process monitoring at the ASP. Process monitoring in the main control room remains available.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-11.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-11. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs

Cables associated with S/G ARV ABPV0004 may be damaged, preventing control of this valve from the control room. The ARV can be isolated by closing air supply valve KAV1429 and nitrogen supply valve KAV1365, then bleeding air from the regulator. Per calculation WCNOC-CP-002, this action is not required to ensure safe shutdown.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Component Cooling Water

Train B CCW could be affected by a fire in this area. If this occurs, swap to Train A CCW using normal operating procedures if Train A CCW is not already running.

3.2.2 Reactor Coolant Pump Seal Cooling

If Train B CCW is operating at the time of the fire, it could be lost causing a temporary loss of thermal barrier cooling. The normal charging pump is not analyzed and is assumed lost. Operators should swap to Train A CCW to restore thermal barrier cooling and line up the Train A CCP to restore RCP seal injection.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post Fire Safe Shutdown is assured if a fire occurs in fire area C-11.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-11.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-11

Table C-11-3 lists all the PFSSD equipment (S. in E-15000) located in fire area C-11. The applicable evaluation section is also listed in Table C-11-3.

Table C-11-3 PFSSD Equipment Located in Fire Area C-13				
Room #	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
3305	TB33106	Terminal Box Train B ESW Damper Control Circuit	5.2.9	
3305	TB33107	Terminal Box Valve BNHV8812B Control Circuit	5.2.8	

5.2 PFSSD CABLE EVALUATION

Table C-11-4 lists all the PFSSD cables (S. in E-15000) located in fire area C-11. The applicable evaluation section is also listed in Table C-11-4.

Table C-11-4
PFSSD Cables Located in Fire Area C-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ABI20HE	3305	ABPV0004	I	5.2.1	SG D ARV I/P Converter (ABPY0004)
14ABI20HG	3305	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HH	3305	ABPV0004	I	5.2.1	SG D Steamline Pressure (ABPT0004)
14ABI20HJ	3305	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HK	3305	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HL	3305	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HM	3305	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HN	3305	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14AEI08LB	3305	AELT0504	I	5.2.3	SG D Wide Range Water Level
14ALB01B2	3305	DPAL01B	C	5.2.4	Auxiliary Feedwater Pump B Motor
14ALB01BG	3305	DPAL01B	C	5.2.4	Auxiliary Feedwater Pump B Motor
14ALB01BM	3305	DPAL01B	C	5.2.4	Auxiliary Feedwater Pump B Motor
14ALG02AF	3305	ALHV0034	C	5.2.4	Cond Storage Tank To MDAFW Pump B
14ALG02AG	3305	ALHV0034	C	5.2.4	Cond Storage Tank To MDAFW Pump B
14ALG02AH	3305	ALHV0034	C	5.2.4	Cond Storage Tank To MDAFW Pump B
14ALG02AK	3305	ALHV0034	C	5.2.4	Cond Storage Tank To MDAFW Pump B
14ALG04AF	3305	ALHV0030	C	5.2.4	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04AG	3305	ALHV0030	C	5.2.4	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04AH	3305	ALHV0030	C	5.2.4	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04AK	3305	ALHV0030	C	5.2.4	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04DF	3305	ALHV0033	C	5.2.4	Train B ESW to TDAFP
14ALG04DG	3305	ALHV0033	C	5.2.4	Train B ESW to TDAFP
14ALG04DH	3305	ALHV0033	C	5.2.4	Train B ESW to TDAFP

Table C-11-4
PFSSD Cables Located in Fire Area C-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALG04DK	3305	ALHV0033	C	5.2.4	Train B ESW to TDAFP
14ALI03AG	3305	ALHV0005	I	5.2.4	MDAFP B to SG D
14ALI03AH	3305	ALHV0005	I	5.2.4	MDAFP B to SG D
14ALI03AJ	3305	ALHV0005	I	5.2.4	MDAFP B to SG D
14ALI03AK	3305	ALHV0005	I	5.2.4	MDAFP B to SG D
14ALI03AL	3305	ALHV0005	I	5.2.4	MDAFP B to SG D
14ALI03AM	3305	ALHV0005	I	5.2.4	MDAFP B to SG D
14ALI03AP	3305	ALHV0005	I	5.2.4	MDAFP B to SG D
14ALI05AG	3305	ALHV0010	I	5.2.4	TDAFP to SG B
14ALI05AH	3305	ALHV0010	I	5.2.4	TDAFP to SG B
14ALI05AJ	3305	ALHV0010	I	5.2.4	TDAFP to SG B (ALHY0010)
14ALI05AK	3305	ALHV0010	I	5.2.4	TDAFP to SG B
14ALI05AM	3305	ALHV0010	I	5.2.4	TDAFP to SG B
14ALI05AN	3305	ALHV0010	I	5.2.4	TDAFP to SG B
14ALI05AQ	3305	ALHV0010	I	5.2.4	TDAFP to SG B
14ALI07AD	3305	ALFT0001	I	5.2.4	Aux Feedwater to SG D Flow
14ALI07AE	3305	ALFT0001	I	5.2.4	Aux Feedwater to SG D Flow
14ALI07HD	3305	ALPT0024	I	5.2.4	MDAFP B Suction Pressure
14ALI07HE	3305	ALPT0024	I	5.2.4	MDAFP B Suction Pressure
14ALI07HF	3305	ALPT0024	I	5.2.4	MDAFP B Suction Pressure
14ALY09AD	3305	ALHV0005	C	5.2.4	MDAFP B to SG D
14BBG39BF	3305	BBHV8000B	C	5.2.5	PZR Power Relief PCV-456A Inlet Isolation
14BBG39BJ	3305	BBHV8000B	C	5.2.5	PZR Power Relief PCV-456A Inlet Isolation

Table C-11-4
PFSSD Cables Located in Fire Area C-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BBI16BA	3305	BBPT0406	I	5.2.6	RCS Hot Leg Wide Range Pressure
14BBI16BB	3305	BBPI0406	I	5.2.6	RCS Hot Leg Wide Range Pressure
14BGB01BB	3305	DPBG05B	C	5.2.7	Centrifugal Charging Pump B Motor
14BGG11DA	3305	BGHV8111	P	5.2.7	CCP B Miniflow Valve
14BGG11DB	3305	BGHV8111	C	5.2.7	CCP B Miniflow Valve
14BGG11DC	3305	BGHV8111	C	5.2.7	CCP B Miniflow Valve
14BGG11DD	3305	BGHV8111	C	5.2.7	CCP B Miniflow Valve
14BGG12BA	3305	BGLCV0112C	P	5.2.7	VCT Outlet Valve
14BGG12BB	3305	BGLCV0112C	C	5.2.7	VCT Outlet Valve
14BGG12BC	3305	BGLCV0112C	C	5.2.7	VCT Outlet Valve
14BGG12BD	3305	BGLCV0112C	C	5.2.7	VCT Outlet Valve BNLCV0112E Permissive
14BGG12BE	3305	BGLCV0112C	C	5.2.7	VCT Outlet Valve SI and Low Level Interlock
14BGG52BA	3305	BGHV8357B	P	5.2.7	CCP B to RCP Seal Injection Valve
14BGG52BB	3305	BGHV8357B	C	5.2.7	CCP B to RCP Seal Injection Valve
14BGG52BC	3305	BGHV8357B	C	5.2.7	CCP B to RCP Seal Injection Valve
14BNG01BA	3305	BNLCV0112E	P	5.2.7	Charging Pump B Suction From RWST
14BNG01BB	3305	BNLCV0112E	C	5.2.7	Charging Pump B Suction From RWST
14BNG01BC	3305	BNLCV0112E	C	5.2.7	Charging Pump B Suction From RWST
14BNG01BD	3305	BNLCV0112E	C	5.2.7	Charging Pump B Suction From RWST
14BNG03BA	3305	BNHV8812B	P	5.2.8	RWST To RHR Pump B Suction
14BNG03BB	3305	BNHV8812B	C	5.2.8	RWST To RHR Pump B Suction
14BNG03BC	3305	BNHV8812B	C	5.2.8	RWST To RHR Pump B Suction
14BNG03BJ	3305	BNHV8812B	C	5.2.8	RWST To RHR Pump B Suction

Table C-11-4
PFSSD Cables Located in Fire Area C-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BNG03BK	3305	BNHV8812B	C	5.2.8	RWST To RHR Pump B Suction Valve
14EFB01SA	3305	DPEF01B	C	5.2.9	Train B ESW Pump Motor
14EFB01SB	3305	DPEF01B	C	5.2.9	Train B ESW Pump Motor
14EFG02CA	3305	EFHV0025	P	5.2.9	Service Water to ESW A Cross Connect Valve
14EFG02CB	3305	EFHV0025	C	5.2.9	Service Water to ESW A Cross Connect Valve
14EFG02CC	3305	EFHV0025	C	5.2.9	Service Water to ESW A Cross Connect Valve
14EFG02CD	3305	EFHV0025	C	5.2.9	Service Water to ESW A Cross Connect Valve
14EFG02CE	3305	EFHV0025	C	5.2.9	Service Water to ESW A Cross Connect Valve
14EFG02CF	3305	EFHV0025	C	5.2.9	Service Water to ESW A Cross Connect Valve
14EFG02DA	3305	EFHV0026	P	5.2.9	Service Water to ESW B Cross Connect Valve
14EFG02DB	3305	EFHV0026	C	5.2.9	Service Water to ESW B Cross Connect Valve
14EFG02DC	3305	EFHV0026	C	5.2.9	Service Water to ESW B Cross Connect Valve
14EFG02DD	3305	EFHV0026	C	5.2.9	Service Water to ESW B Cross Connect Valve
14EFG02DE	3305	EFHV0026	C	5.2.9	Service Water to ESW B Cross Connect Valve
14EFG02DF	3305	EFHV0026	C	5.2.9	Service Water to ESW B Cross Connect Valve
14EFG02SD	3305	DFEF01B	C	5.2.9	Train B ESW Traveling Water Screen
14EFG03AA	3305	EFHV0039	P	5.2.9	ESW A to Service Water System
14EFG03AB	3305	EFHV0039	C	5.2.9	ESW A to Service Water System
14EFG03AC	3305	EFHV0039	C	5.2.9	ESW A to Service Water System
14EFG03AD	3305	EFHV0039	C	5.2.9	ESW A to Service Water System
14EFG03AE	3305	EFHV0039	C	5.2.9	ESW A to Service Water System
14EFG03BA	3305	EFHV0040	P	5.2.9	ESW B to Service Water System
14EFG03BB	3305	EFHV0040	C	5.2.9	ESW B to Service Water System

Table C-11-4
PFSSD Cables Located in Fire Area C-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EFG03BC	3305	EFHV0040	C	5.2.9	ESW B to Service Water System
14EFG03BD	3305	EFHV0040	C	5.2.9	ESW B to Service Water System
14EFG03BE	3305	EFHV0040	C	5.2.9	ESW B to Service Water System
14EFG03SD	3305	EFHV0092	C	5.2.9	Train B ESW Screen Wash Valves
14EFG06BA	3305	EFHV0038	P	5.2.9	ESW B to Ultimate Heat Sink
14EFG06BB	3305	EFHV0038	C	5.2.9	ESW B to Ultimate Heat Sink
14EFG06BC	3305	EFHV0038	C	5.2.9	ESW B to Ultimate Heat Sink
14EFG06SD	3305	EFHV0098	C	5.2.9	Train B ESW Pump Air Release Valve
14EFI08RB	3305	EFPT0002	I	5.2.9	ESW Pump 1B Discharge Pressure
14EFI11FA	3305	EFFT0054	I	5.2.9	ESW B Flow Transmitter
14EFK01SA	3305	EFHIS0056B	C	5.2.9	Train B ESW Pump Control HIS
14EGB01BB	3305	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BC	3305	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BD	3305	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BE	3305	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BG	3305	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BK	3305	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01DB	3305	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGB01DC	3305	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGB01DD	3305	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGB01DE	3305	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGB01DG	3305	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGG05DD	3305	EGHV0054	C	5.2.10	CCW B to Service Loop

Table C-11-4
PFSSD Cables Located in Fire Area C-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EJB01BB	3305	DPEJ01B	C	5.2.8	RHR Pump B Motor
14EJG04BA	3305	EJHV8804B	P	5.2.8	RHR B Supply to SI Pump B Iso Valve
14EJG04BB	3305	EJHV8804B	C	5.2.8	RHR B Supply to SI Pump B Iso Valve
14EJG04BC	3305	EJHV8804B	C	5.2.8	RHR B Supply to SI Pump B Iso Valve
14EJG08BB	3305	EJFCV0611	C	5.2.8	RHR Pump B Miniflow Valve
14EJG08BC	3305	EJFCV0611	C	5.2.8	RHR Pump B Miniflow Valve
14EJG08BE	3305	EJFCV0611	P	5.2.8	RHR Pump B Miniflow Valve
14EJG08BF	3305	EJFIS0611	C	5.2.8	RHR B Mini Flow Indicating Switch
14EMB01BB	3305	DPEM01B	C	5.2.11	SI Pump B Motor
14ENB01BB	3305	DPEN01B	C	5.2.12	Containment Spray Pump B Motor
14GDG01BE	3305	DCGD01B	C	5.2.9	ESW Pump Room Supply Fan B Motor (GDHS0011)
14GDG01BF	3305	DCGD01B	C	5.2.9	ESW Pump Room Supply Fan B Motor (GDHS0011)
14GDG01BH	3305	DCGD01B	C	5.2.9	ESW Pump Room Supply Fan B Motor (GDHS0011)
14GDI04BA	3305	GDTE0011	I	5.2.9	ESW Pump Room Supply Fan B Damper
14GDI04BB	3305	GDTZ0011A	I	5.2.9	Train B ESW Pump Room Inlet Damper
14GDI04BC	3305	GDTZ0011B	I	5.2.9	Train B ESW Pump Room Recirc Damper
14GDI04BF	3305	GDTE0011	I	5.2.9	Train B ESW Pump Room Temperature Element
14GDI04BG	3305	GDTZ0011A	I	5.2.9	Train B ESW Pump Room Inlet Damper
14GDI04BH	3305	GDTZ0011B	I	5.2.9	Train B ESW Pump Room Recirc Damper
14GDY01BA	3305	CGD01B	C	5.2.9	ESW Pump Room B Supply Fan

Table C-11-4
PFSSD Cables Located in Fire Area C-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GDY01BB	3305	CGD01B	C	5.2.9	ESW Pump Room B Supply Fan
14GDY01BD	3305	CGD01B	C	5.2.9	ESW Pump Room B Supply Fan
14GFG01BC	3305	DSGF02B	C	5.2.4	AFW Pump B Room Cooler Motor
14GKG02BA	3305	SGK04B	P	5.2.13	Control Room A/C Unit B
14GKG13BA	3305	SGK05B	P	5.2.14	Class 1E Elec. Equip. Room A/C Unit B
14GKG13BG	3305	SGK05B	C	5.2.14	Class 1E Elec. Equip. Room A/C Unit B
14GKG13BH	3305	SGK05B	C	5.2.14	Class 1E Elec. Equip. Room A/C Unit B
14GKY02BA	3305	GKHZ0040A/B	C	5.2.13	Control Room A/C Unit 4B Supply/Discharge Dampers
14GKY02BB	3305	GKHZ0040B	C	5.2.13	Control Room A/C Unit 4B Discharge Damper
14GKY02BC	3305	GKHZ0040A	C	5.2.13	Control Room A/C Unit 4B Supply Damper
14GKY02BD	3305	GKHZ0040A/B	C	5.2.13	Control Room A/C Unit 4B Supply/Discharge Dampers
14GKY02BE	3305	GKHZ0040A/B	P	5.2.13	Control Room A/C Unit 4B Supply/Discharge Dampers
14GKY02BF	3305	GKHZ0040A/B	P	5.2.13	Control Room A/C Unit 4B Supply/Discharge Dampers
14GLG05BA	3305	DSGL10B	P	5.2.8	Train B RHR Room Cooler Motor
14GLG05HA	3305	DSGL12B	P	5.2.7	Train B CCP Room Cooler Motor
14GLG06BD	3305	DSGL11B	C	5.2.10	CCW Pump B Room Cooling Fan Motor
14GMG01BH	3305	GMHS0011B	C	5.2.15	Train B Diesel Generator Room Supply Fan Isolation Switch
14GMK04BA	3305	GMHZ0019	C	5.2.15	Train B DG Room Exhaust Damper
14GMK04BB	3305	GMHZ0019	C	5.2.15	Train B DG Room Exhaust Damper

Table C-11-4
PFSSD Cables Located in Fire Area C-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GMK04BE	3305	GMHZ0019	C	5.2.15	Train B DG Room Exhaust Damper (GMHS019B)
14JEG01BB	3305	DPJE01B	C	5.2.15	Emergency Fuel Oil Transfer Pump B Motor
14JEG01BD	3305	DPJE01B	C	5.2.15	Emergency Fuel Oil Transfer Pump B Motor
14JEG01BE	3305	DPJE01B	C	5.2.15	Emergency Fuel Oil Transfer Pump B Motor
14JEI04BA	3305	JELT0021	I	5.2.15	Emergency Fuel Oil Day Tank B Level
14KJK03AA	3305	KKJ01B	P	5.2.15	Train B Emergency Diesel Engine
14KJK03AH	3305	KKJ01B	C	5.2.15	Train B Emergency Diesel Engine
14KJK03AJ	3305	KJ122	C	5.2.15	Train B Diesel Generator Control Panel
14KJK03AK	3305	KKJ01B	C	5.2.15	Train B Emergency Diesel Engine
14KJK07AE	3305	NE106	I	5.2.15	Train B D/G Control Panel
14NBB04AB	3305	NBHS0011	C	5.2.16	NB02 Synchro-scope/Selector Switch
14NBB04AD	3305	NBHS0011	C	5.2.16	NB02 Synchro-scope/Selector Switch
14NBB04AE	3305	NBHS0011	C	5.2.16	NB02 Synchro-scope/Selector Switch
14NBB04AF	3305	NBHS0011	C	5.2.16	NB02 Synchro-scope/Selector Switch
14NBB05AC	3305	NBHS0008	C	5.2.16	XNB02 to NB0209 Synch Transfer Switch
14NBB06AC	3305	NBHS0009	C	5.2.16	XNB01 to NB0212 Synch Transfer Switch
14NBB14AA	3305	NB00209	C	5.2.16	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AB	3305	NB00209	C	5.2.16	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AC	3305	NB00209	C	5.2.16	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AD	3305	NB00209	C	5.2.16	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AE	3305	NB00209	C	5.2.16	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AF	3305	NB00209	C	5.2.16	Bus NB02 Feeder Breaker NB0209 Control

Table C-11-4
PFSSD Cables Located in Fire Area C-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NBB14AG	3305	NB00209	C	5.2.16	Bus NB02 Feeder Breaker NB0209 Control
14NBB15AA	3305	NB00212	C	5.2.16	Bus NB02 Feeder Breaker NB0212 Control
14NBB15AC	3305	NB00212	C	5.2.16	Bus NB02 Feeder Breaker NB0212 Control
14NBK15AA	3305	NB002	P	5.2.16	NB02 DC Breaker Control Power
14NBK15AB	3305	NB002	P	5.2.16	NB02 DC Breaker Control Power
14NEB02AL	3305	NE106	C	5.2.15	Train B D/G Control Panel
14NEB11AA	3305	NB00211	C	5.2.15	Train B D/G Feeder Breaker NB0211 Control
14NEB11AD	3305	NB00211	C	5.2.15	Train B D/G Feeder Breaker NB0211 Control
14NEK13AA	3305	NE106	P	5.2.15	Train B D/G Exciter Control Power
14NEK13AD	3305	NE106	C	5.2.15	Train B D/G Control Panel
14NEK13AJ	3305	NE106	I	5.2.15	Train B D/G Control Panel
14NFK01CA	3305	NF039A	C	5.2.17	Load Shed Ch 1 Logic (UV Relay)
14NFK01DA	3305	NF039B	C	5.2.17	Load Shed Ch 4 Logic (UV Relay)
14NFY01EA	3305	NF039A	C	5.2.17	Load Shed Ch 1 Logic (PT Input)
14NFY01FA	3305	NF039B	C	5.2.17	Load Shed Ch 4 Logic (PT Input)
14NGB10AB	3305	NB00213	C	5.2.18	Breaker NB0213 to XNG02 Control
14NGB10BB	3305	NB00210	C	5.2.18	Breaker NB0210 to XNG04 Control
14NGB10SA	3305	NB00216	C	5.2.18	Breaker NB0216 to XNG06 Control
14NGB10SB	3305	NG006E	C	5.2.18	NG006E Breaker Control Power
14NGG01AD	3305	NG002B	P	5.2.18	Breaker NG0207 to NG02BAF1
14NGG01AE	3305	NG002B	P	5.2.18	Breaker NG0207 to NG02BAF1
14NGG01AJ	3305	DSGN01B	P	5.2.18	Containment Cooler Fan B Motor
14NGG01BB	3305	NG004C	P	5.2.18	Breaker NG0406 to NG04CMF1

Table C-11-4
PFSSD Cables Located in Fire Area C-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NGG01BC	3305	NG004C	P	5.2.18	Breaker NG0406 to NG04CMF1
14NGG01BF	3305	DSGN01D	P	5.2.18	Containment Cooler Fan D Motor
14NGG11AA	3305	NG00201	C	5.2.18	Breaker NG0201 Control
14NGG11BA	3305	NG00401	C	5.2.18	Breaker NG0401 Control
14NGK11AA	3305	NG00201	P	5.2.18	Bus NG02 DC Breaker Control Power
14NGK11AB	3305	NG00201	P	5.2.18	Bus NG02 DC Breaker Control Power
14NGK11BA	3305	NG00401	P	5.2.18	Bus NG04 DC Breaker Control Power
14NGK11BB	3305	NG00401	P	5.2.18	Bus NG04 DC Breaker Control Power
14NGY13BA	3302	NG100B	P	5.2.	CVCS Heat Tracing Isolation Fuses
14NNG01AA	3305	NN14	P	5.2.19	480 VAC Power to Inverter NN14
14NNG01BA	3305	NN12	P	5.2.19	480 VAC Power to Inverter NN12
14NNK01MA	3305	NN16	P	5.2.19	125 VDC Power to Swing Inverter NN16
14NNK01MB	3305	NN16	P	5.2.19	125 VDC Power to Swing Inverter NN16
14NNY01HA	3305	NN14	P	5.2.19	120 VAC Pwr to NN14 from Swing Inv NN16
14NNY01HB	3305	NN14	P	5.2.19	120 VAC Pwr to NN14 from Swing Inv NN16
14PKK11AA	3305	PK022	C	5.2.18	NG0409 Breaker Control
14PNG01AD	3305	PN008	P	5.2.20	Non-Class 1E Electrical Equipment AC Distribution Panel
14PNG01AE	3305	PN008	P	5.2.20	Non-Class 1E Electrical Equipment AC Distribution Panel
14RPK09BA	3305	RP140	P	5.2.9	125 VDC to Auxiliary Relay Rack RP140
14RPK09NA	3305	RP335	P	5.2.22	125 VDC to Auxiliary Relay Rack RP335
14RPK15BA	3305	86XRP5	C	5.2.22	Control room lockout relay (RP335)

Table C-11-4
PFSSD Cables Located in Fire Area C-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14RPK15CA	3305	86XRP6	C	5.2.22	Control room lockout relay (RP335)
14RPK15DA	3305	86XRP7	C	5.2.22	Control room lockout relay (RP335)
14RPY09GA	3305	RP147B	P	5.2.23	120 VAC Power to RP147B from NN0404
14RPY10BA	3305	RP068	P	5.2.23	120 VAC Power to RP068 from NG02ACR136
14SBS16AA	3305	BBTI0423X	I	5.2.21	RCS Cold Leg Loop 2 Temp Ind (WR) at RP118B
14SBS16BA	3305	AELI0504A	I	5.2.21	SG D Wide Range Level Indicator at RP118B
14SBS16EA	3305	BBTI0443A	I	5.2.21	RCS Hot Leg Loop 4 Temp Ind (WR) at RP118B
14SBS16NA	3305	BBPI0406X	I	5.2.21	RCS Wide Range Pressure Ind at RP118B
14SBS16XA	3305	AELI0502A	I	5.2.21	SG B Wide Range Level Indicator at RP118B
14SBS16YA	3305	AELI0504A	I	5.2.21	SG D Wide Range Level Indicator at RP118B
14SBS16ZA	3305	BBLI0460B	I	5.2.21	Pressurizer Level Indicator (NR) at RP118B
14SBY09HA	3305	SB148B	P	5.2.2	120 VAC to Panel SB148B from NN0420
16BBA01CC	3305	DPBB01C	C	5.2.24	Reactor Coolant Pump C Motor
16BBA01DC	3305	DPBB01D	C	5.2.24	Reactor Coolant Pump D Motor
16FCY35AA	3305	FC170A	P	5.2.25	Steam Generator Feed Pump B Term Cabinet
16NBA10AB	3305	XNB01	C	5.2.16	NB0212 Lockout Relay 286-2/T1 (MA104F)
16NBA11AC	3305	XNB02	C	5.2.16	NB0209 Lockout Relay 286-1/T2 (PA0201)
16NBA11AE	3305	XNB02	C	5.2.16	NB0109 Lockout Relay 286-2/T2 (PA0201)
16NBB03AB	3305	XNB01	P	5.2.16	XNB01 Phase Differential Relay 287/T1 (MA0104F)
16NBB05AD	3305	XNB02	P	5.2.16	XNB02 Phase Differential Relay 287/T2 (PA0201)

Table C-11-4
PFSSD Cables Located in Fire Area C-11

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16NBB05AL	3305	XNB02	P	5.2.16	XNB02 Phase Differential Relay 287/T2 (PA0201)
16PGA11AC	3305	PA0207	C	5.2.26	Load Centers PG14, PG18, PG20 and PG24 Fdr Bkr
16RPY10AA	3305	PN10	P	5.2.25	Non-Class 1E 120 VAC Inverter

5.2.1 Steam Generator Atmospheric Relief Valves

PFSSD requires at least two steam generator atmospheric relief valves (ARV) be controlled and the other two closed. The ARVs are pneumatically operated using air from the compressed air system (KA) or nitrogen from the nitrogen accumulators. The valves open by pneumatic pressure and close by spring action. A pressure transmitter installed on the outlet side of the steam generator sends a signal to a controller and automatically controls the associated ARV position. Alternatively, each ARV can be controlled manually from the control room or the auxiliary shutdown panel by placing the pressure indicating controller (PIC) in manual.

Cables associated with steam generator D ARV ABPV0004 are run in area C-11. Damage to these cables could cause the ARV to spuriously open or prevent control or closure of the ARV. Cables associated with the remaining ARVs are run in a different fire area.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

If ABPV0004 remains open and does not self-mitigate, operators can close the ARV by isolating air and nitrogen to fail the ARV closed. Air is isolated by closing valve KAV1429 and nitrogen is isolated by closing valve KAV1365. The air and nitrogen supply valves are located in fire area A-23 and access is available without having to traverse area C-11.

Based on the above discussion, ARV ABPV0004 could fail in the open or closed position but no action is necessary to mitigate the failed ARV. PFSSD is assured using the remaining three ARVs.

References: E-15000, XX-E-013, E-13AB20B, E-1F9101, M-12AB01, M-12KA04, M-12KA05, WCNOC-CP-002

5.2.2 Process Monitoring Fire Isolation Cabinets SB148A and SB148B

The PFSSD function of cabinets SB148A and SB148B is to provide reliable process monitoring instrumentation at the auxiliary shutdown panel (ASP) in the event of a fire in the control room. This allows operators the ability to monitor critical process variables during shutdown from outside the control room. Process variables that can be monitored at the ASP as well as in the main control room (MCR) are as follows:

- AELT0502 – Steam Generator B Wide Range Water Level (SB148A)
- AELT0504 – Steam Generator D Wide Range Water Level (SB148B)
- BBLT0460 – Pressurizer Level Transmitter Narrow Range (SB148A)
- BBTE0423B – RCS Loop 2 Cold Leg Temperature Element (SB148A)
- BBTE0443A – RCS Loop 4 Hot Leg Temperature Element (SB148A)
- BBPT0406 – RCS Wide Range Hot Leg Pressure Transmitter (SB148B)

The instrument cable from each transmitter or temperature element runs to the SB148 cabinet indicated above. The signal is split and runs to the ASP and MCR via independent instrument cables. Cable 14SBY09HA is a power cable that provides 120 VAC to cabinet SB148B. A loss of power to SB148B could result in a loss of capability to monitor AELT0504 and BBPT0406 from the ASP and the MCR.

A loss of capability to monitor AELT0504 and BBPT0406 from the MCR will not adversely impact PFSSD. Redundant capability exists to monitor these variables as described below:

- AELT0547, AELT0548, AELT0549 and AELT0554 are available to provide level indication (narrow range) for steam generator D to associated indicators in the control room.
- BBPT0405 is available to provide RCS pressure to pressure indicator BBPI0405.

Based on the above discussion, a fire in area C-11 that affects the process monitoring instrumentation associated with cabinet SB148B will not impact the ability to achieve and maintain PFSSD due to the availability of redundant process monitoring instrumentation in the control room.

References: XX-E-013, E-15000, E-13AE08, E-13BB15, E-13BB16, E-13SB09, E-13SB16, E-13NN01, E-1F9201, E-1F9203, E-1F9205, E-1F9301, E-1F9421, M-12AE02, M-12BB01, M-12BB04

5.2.3 Steam Generator Level Indication

The decay heat removal function for PFSSD requires the use of two RCS loops and two Steam Generators. Steam generator (SG) level indication is required to support this function.

An instrument cable associated with steam generator D wide range level transmitter AELT0504 is run in this area. Damage to this cable could prevent wide range indication of steam generator D level in the control room. Cables associated with all four steam generator D narrow range level transmitters are run in a different fire area and are unaffected by a fire in C-11. Therefore, level indication on steam generator D is available.

Based on the above discussion, steam generator level indication is available on all four steam generators.

References: E-15000, XX-E-013, E-13AE08, E-1F9203, M-12AE02

5.2.4 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

Cables associated with Train B MDAFP are run in area C-11. Damage to these cables could prevent operation of the pump. The Train A MDAFP and the TDAFP remain available to ensure auxiliary feedwater.

Cables associated with valves ALHV0030 and ALHV0034 could be damaged by a fire and cause the valves to spuriously close, or prevent operation from the control room. These valves control the Train B MDAFP suction from the essential service water (ESW) and condensate storage tank (CST) sources, respectively. Suction supply valves from ESW and CST to the Train A MDAFP are unaffected by a fire in this area.

Cables associated with valve ALHV0033 could be damaged by a fire and prevent operation from the control room. This valve provides a suction source from Train B ESW to the TDAFP and is normally closed. The CST and Train A ESW suction sources to the TDAFP are unaffected.

The Train B MDAFP to steam generator (SG) D control valve (ALHV0005) may spuriously close or may not operate. The TDAFP is available to supply SG D through valve ALHV0006, which is unaffected by a fire in area C-11.

Valve ALHV0010 could be affected such that the valve cannot be controlled from the control room or the valve may spuriously close. This valve controls auxiliary feedwater flow from the TDAFP to SG B. Valve ALHV0009 is unaffected by a fire in area C-11 and is available to ensure an adequate auxiliary feedwater supply from the Train A MDAFP to SG B.

Auxiliary feedwater to SG D flow transmitter ALFT0001 may be affected. Flow transmitters on SGs A, B and C supply lines are unaffected.

Train B MDAFP suction pressure transmitter (ALPT0024) may be affected. Suction pressure transmitters on Train A MDAFP and TDAFP suction lines are unaffected.

A cable (14GFG01BC) associated with the Train B MDAFP room cooler motor (DSGF02B) is run in this area. Damage to this cable could prevent operation of the cooler. The Train A MDAFP room cooler (SGF02A) is unaffected.

In summary, the Train A MDAFP is available to supply auxiliary feedwater to SGs B and C using either the CST or the ESW as the supply. In addition, the TDAFP is available to supply auxiliary feedwater to steam generators A, C and D using either the CST or the ESW as the supply, however the flow transmitter for SG D may not be available.

References: E-15000, XX-E-013, E-13AL01B, E-13AL02B, E-13AL03B, E-13AL04B, E-13AL05B, E-13AL07B, E-13AL09, E-13GF01, E-1F9202, E-1F9203, E-1F9204, E-1F9444, M-12AL01, M-12GF01

5.2.5 Pressurizer Power Operated Relief Valves and Associated Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed.

A fire in area C-11 could damage cables for block valve BBHV8000B such that the block valve fails to respond to a close signal. Cables associated with redundant pressurizer PORV BBPCV0456A do not run in area C-11. Therefore, the pressurizer PORV will function normally throughout the event. Cables associated with BBHV8000A and BBPCV0455A do not run in fire area C-11.

Based on the above discussion, both pressurizer relief flow paths will remain isolated in the event of a fire in area C-11.

References: E-15000, XX-E-013, E-13BB39, E-1F9301, M-12BB02

5.2.6 Reactor Coolant System (RCS) Pressure Indication

PFSSD requires RCS pressure indication to be available. RCS pressure indication is provided in the control room using BBPI0405 or BBPI0406. Cables for BBPT0406 and BBPI0406 run through fire area C-11. Therefore, pressure indicator BBPI0406 may not function.

Cables for BBPT0405 are run in a separate fire area and are unaffected by a fire in area C-11. Therefore, RCS pressure indication will be available using BBPI0405 if a fire occurs in area C-11.

References: E-15000, XX-E-013, E-13BB16, E-1F9201, M-12BB04

5.2.7 Centrifugal Charging System

The PFSSD reactivity control and makeup functions require an available centrifugal charging pump (CCP) taking suction from the RWST and injecting through the reactor coolant pump (RCP) seals or through the boron injection tank (BIT). The normal charging pump (NCP) is not credited for PFSSD and is assumed lost.

Cable 14BGB01BB is a control cable associated with Train B CCP motor DPBG05B. Damage to this cable could prevent operation, or cause maloperation, of the CCP. Cables associated with Train A CCP motor DPBG05A are unaffected by a fire in this area.

Power and control cables associated with Train B CCP miniflow valve BGHV8111 are run through area C-11. Cables for Train A CCP miniflow valve BGHV8110 are unaffected by a fire in area C-11.

Valves BGLCV0112B and BGLCV0112C are series installed isolation valves on the discharge side of the VCT. The PFSSD position of these valves is at least one closed with the RWST lined up to the charging header. Both valves are required to be open if the credited charging pump is operating and the RWST is not lined up to the charging header, to ensure a positive suction head on the charging pump. Continued operation in this manner could damage the charging pump due to hydrogen intrusion because makeup to the VCT via the letdown path is not ensured.

Power and control cables associated with valve BGLCV0112C are run in this area. Damage to these cables could prevent closing the valve from the control room. Redundant valve BGLCV0112B is unaffected and will close using the handswitch (BGHIS0112B) in the control room or in response to an automatic signal.

Cable 14BGG12BE provides the permissive for valve BGLCV0112C to close when either a SIS or a VCT low-low level is received coincident with a fully open RWST to CCP valve BNLCV0112E. Cable 14BGG12BD monitors a position switch on BNLCV0112E and provides the permissive for BGLCV0112C to close when BNLCV0112E is fully open. A simultaneous hot short in these cables would bypass the SIS and VCT low-low level contacts as well as the BNLCV0112E position contact and signal valve BGLCV0112C to close. If this occurs prior to the RWST being lined up to the charging header, damage to the operating charging pump could occur.

Calculation XX-E-013, assumption 3-A-22, states that systems and components are in their normal operating position or status prior to the fire. The NCP is the normally operated pump and is assumed to be operating at the time of the fire. Inadvertent closure of valve BGLCV0112C with no suction from the RWST could result in damage to the NCP but the centrifugal charging pumps would remain unaffected.

Power cable 14BGG52BA and control cables 14BGG52BB and 14BGG52BC associated with Train B CCP to RCP seal injection isolation valve BGHV8357B could be affected by a fire in this area. The Train A CCP to RCP seal injection valve BGHV8357A is unaffected by the fire.

Power cable 14BNG01BA and control cables 14BNG01BB, 14BNG01BC and 14BNG01BD associated with RWST to CCP suction header valve BNLCV0112E run in this area. Damage to these cables could prevent opening the valve from the control room or in response to an automatic signal. Cables associated with redundant RWST to CCP suction header valve BNLCV0112D are unaffected by a fire in this area. Therefore, the RWST is available to provide suction to the CCPs.

Cable 14GLG05HA is the power cable for Train B CCP room cooler DSGL12B. Damage to this cable will prevent operation of the cooler. The Train A CCP room cooler is unaffected by a fire in this area.

Based on the above discussion, the Train B CCP may not be available but the Train A CCP is unaffected by a fire in area C-11.

References: E-15000, XX-E-013, E-13BG01A, E-13BG11C, E-13BG12A, E-13BG52, E-13BN01A, E-1F9102, E-1F9302, M-12BG03, M-12BN01

5.2.8 Residual Heat Removal

The residual heat removal (RHR) system is required for decay heat removal during transition from hot shutdown to cold shutdown. At least one train of RHR is requried to be operable for PFSSD.

A control cable associated with Train B RHR pump motor DPEJ01B is run in this area. In addition, cables associated with Train B RHR pump miniflow valve EJFCV0611 and RHR pump B miniflow indicating switch EJFIS0611 are run in this area. Damage to these cables could affect operation of the Train B RHR pump. The Train A RHR pump and miniflow valve are unaffected by a fire in this area and remain available to ensure shutdown cooling.

Terminal box, power and control cables associated with RWST to Train B RHR pump valve BNHV8812B run in this area. Damage to the terminal box and cables could prevent opening the valve or could cause the valve to spuriously open. Maloperation of this valve would prevent establishing a suction source from the RWST to the Train B RHR pump. Cables associated with RWST to Train A RHR pump valve BNHV8812A do not run in this area. Therefore, the RWST is available to provide a suction source to the Train A RHR pump. Spurious operation of BNHV8812B would allow the RWST to drain to the containment sump if containment sump isolation valve EJHV8811B were to spuriously open. Cables associated with EJHV8811B do not run in fire area C-11. In addition, a fire-induced spurious safety injection signal or RWST low-low level signal is not credible. Therefore, containment sump isolation valve EJHV8811B will not spuriously open and the RWST will not drain to the containment sump.

Valve EJHV8804B is the RHR pump B to Safety Injection pump isolation valve. Cable 14EJG04BA is the power cable for valve EJHV8804B. Cables 14EJG04BB and 14EJG04BC are control cables for valve EJHV8804B. Valve EJHV8804B is normally closed and is required to remain closed during RHR Train B operation. Damage to the power cable would cause the valve to remain in its normally closed position. Damage to the control cables could result in the valve spuriously opening. The Train A RHR pump is credited if a fire occurs in this area. Therefore, spurious opening of this valve will not adversely impact PFSSD.

Power cable 14GLG05BA, associated with Train B RHR pump room cooler SGL10B, may be damaged, causing inoperability of the cooler. Train A RHR pump room cooler SGL10A is unaffected.

Based on the above discussion, the Train B RHR system may be affected by a fire in area C-11 but the Train A RHR system is unaffected.

References: E-15000, XX-E-013, E-13BN03A, E-13EJ01, E-13EJ04B, E-13EJ06B, E-13EJ08, E-13GL05, E-1F9102, E-1F9205, E-1F9401A, M-12BN01, M-12EJ01

5.2.9 Essential Service Water

Either the Train A or the Train B essential service water (ESW) system is required to be available to ensure PFSSD. The ESW system supplies water to the following PFSSD components on the associated train:

- CCP room cooler
- RHR pump room cooler
- Class 1E switchgear room A/C condenser
- diesel generator engine cooling
- control room A/C condenser
- auxiliary feedwater pump room cooler
- motor and turbine driven auxiliary feedwater pump suction (backup to CST)
- containment air coolers
- electrical penetration room cooler
- component cooling water pump room cooler
- component cooling water heat exchanger
- component cooling water system makeup

Cables associated with Train B essential service water (ESW) system run in this area. As discussed below, damage to these cables could prevent operation of the Train B ESW system. However, the Train A ESW system remains available.

Cables 14EFB01SA and 14EFB01SB are associated with Train B ESW pump PEF01B. Damage to these cables could prevent operation of the pump. Cables associated with Train A ESW pump PEF01A run in a separate fire area.

The service water to/from ESW system cross connect flowpath needs to be isolated for PFSSD to prevent flow diversion from ESW to service water. Each cross connect has four series valves; two on the supply and two on the return. The following table identifies the valves on each ESW Train.

Series Installed Service Water to/from Essential Service Water Cross-Connect Valves			
Train A ESW Supply From SW	**Train B ESW Supply From SW**	**Train A ESW Return To SW**	**Train B ESW Return To SW**
EFHV0023	EFHV0024	EFHV0041	EFHV0042
EFHV0025	EFHV0026	EFHV0039	EFHV0040

At least one valve on the supply and one on the return needs to be closed. Cables associated with valves EFHV0025, EFHV0026, EFHV0039 and EFHV0040 are run in this area. Cables associated with valves EFHV0023, EFHV0024, EFHV0041 and EFHV0042 are unaffected. Therefore, at least one valve on each line will be available to ensure the flowpath is isolated. In addition, check valve EFV0470 is installed between valves EFHV0023 and EFHV0025 and will prevent flow diversion from Train A ESW to the service water system. Also, check valve EFV0471 is installed between valves EFHV0024 and EFHV0026 and will prevent flow diversion from Train B ESW to the service water system.

The Train B ESW return to ultimate heat sink (UHS) valve EFHV0038 may be affected due to damage to cables 14EFG06BA, 14EFG06BB and 14EFG06BC. However, cables associated with the Train A ESW return valve to the UHS (EFHV0037) are unaffected.

Train B ESW pump discharge pressure transmitter EFPT0002 may be affected due to damage to an instrument cable (14EFI08RB). Train A ESW pump pressure transmitter EFPT0001 is unaffected.

Train B ESW pump flow transmitter EFFT0054 may be affected due to damage to an instrument cable (14EFI11FA). Train A ESW pump flow transmitter EFFT0053 is unaffected.

The Train B ESW pump room supply fan motor DCGD01B may not be available due to damage to cables associated with the fan. The Train A ESW pump room supply fan motor is unaffected.

Cables 14GDI04BA and 14GDI04BF provide ESW B room temperature from temperature element GDTE0011 to temperature controller GDTC0011. Cables 14GDI04BB and 14GDI04BG provide signals from GDTC0011 to outside air intake damper GDTZ0011A. Cables 14GDI04BC and 14GDI04BH provide signals from GDTC0011 to recirculation damper GDTZ0011B. Terminal box TB33106 provides a connection point for these cables. Damage to these cables or terminal box could prevent operation of the dampers. Temperature controls for Train A ESW pump room are unaffected by a fire in area C-11.

Cable 14GDY01BA is associated with the automatic and manual start circuit for the Train B ESW pump room supply fan. Cable 14GDY01BB is associated with the automatic start on the Train B ESW pump room supply fan control circuit. Upon start of the Train B ESW pump, the contacts on this circuit close and energize the ARC relay, which closes a contact to start the supply fan. Cable 14GDY01BD is associated with a bistable element that prevents the fan from starting if the room temperature is below a pre-determined set point. Damage to these cables due to a fire could spuriously start the fan or prevent it from starting. In either case, the Train A ESW pump room ventilation system is unaffected by a fire in area C-10.

Cable 14RPK09BA supplies 125 VDC power to ESW pump motor B interposing relays 1XEF32, 1XEF34, 1XEF36 located in relay rack RP140. Cable 14EFK01SA is a control cable associated with local hand switch EFHIS0056B. The hand switch and interposing relays operate to control the Train B ESW pump locally. Damage to the cables could prevent local operation of the Train B ESW pump and could override control room hand switch signals, preventing operation of the pump. Local control of the Train A ESW pump is unaffected by a fire in area C-11.

Cable 14EFG02SD is a control cable that provides an automatic start signal to the Train B ESW traveling water screen motor DFEF01B when the Train B ESW pump runs. Damage to the cable could prevent automatic operation of the screen. Circuits for Train A traveling water screen do not run through area C-11.

Cable 14EFG03SD is a control cable associated with ESW Train B screen wash water valve EFHV0092. Damage to this cable could prevent operation of the valve. Circuits for Train A screen wash water valve EFHV0091 do not run through area C-11.

Cable 14EFG06SD is associated with Train A ESW pump air release valve EFHV0098. The air release valve purges air from the pump casing upon pump start to ensure pump operability. Damage to the cable could prevent operation of the air release valve. Circuits for Train A ESW pump air release valve EFHV0097 do not run through area C-11.

Based on the above discussion, the Train A ESW pump and associated components are available if a fire occurs in area C-11.

References: XX-E-013, E-15000, E-093-00055, E-13EF02, E-13EF02A, E-13EF03, E-13EF06A, E-13EF11, E-13RP09, E-1F9402A, E-1F9402B, E-1F9403, E-1F9443, E-K3EF01A, E-K3EF02, E-K3EF03, E-K3EF06, E-K3EF08, E-K3GD01A, E-K3GD04, E-K3GD04A, M-12EF01, M-12EF02, M-K2EF01, M-K2GD01

5.2.10 Component Cooling Water

For PFSSD, the component cooling water (CCW) system is used to provide cooling to the centrifugal charging pump (CCP) oil cooler, seal water heat exchanger, the RHR heat exchanger and the RHR pump seal cooler. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Cables associated with Train B CCW pump motors DPEG01B and DPEG01D run in this area. Damage to these cables could prevent operation of the pumps. Cables associated with Train A CCW pump motors DPEG01A and DPEG01C are run in a different area.

Cable 14EGG05DD, associated with Train B CCW valve EGHV0054, is run in this area. This cable supplies power to auxiliary relay 3XEG10 which provides permissives to open or close valves in the CCW supply to and from the Radwaste building. If Train B CCW is operating at the time of the fire, valve EGHV0054 will be open. Damage to cable 14EGG05DD could cause the control power fuse to blow and prevent closure of EGHV0054 when lining up Train A CCW. A loss of power to NB02, which is possible if a fire occurs in this area, could also prevent closure of valves EGHV0016 and EGHV0054. Operation of Train A CCW with valves EGHV0016 and EGHV0054 open could cause Train A CCW flow to divert to Train B CCW system. Per calculation M-EG-24, the system will continue to operate with no damage to the pumps if the valves in the opposite train are open.

Cable 14GLG06BD, associated with Train B CCW pump room cooler SGL11B, runs in area C-11. Damage to this cable could prevent automatic operation of the unit. The Train A CCW pump room cooler SGL11A is unaffected by a fire in this area.

Based on the above discussion, the Train B CCW system could be affected by a fire in area C-11 but the Train A CCW system is available.

References: XX-E-013, E-15000, E-13EG01C, E-13EG01D, E-13EG05D, E-13GL06, E-1F9401A, E-1F9444, M-12EG01, M-12GL02, Calculation M-EG-24

5.2.11 Safety Injection Pumps

The PFSSD strategy is to prevent operation of the Safety Injection (SI) pumps to ensure an adequate supply of borated water in the RWST. One cable (14EMB01BB) associated with Train B SI pump motor (DPEM01B) is run in area C-11. Damage to this cable could cause the spurious start of the pump and could prevent stopping the pump from the control room.

If the Train B SI pump spuriously starts with the reactor at normal pressure, PFSSD will be assured. The pump will not discharge into the RCS due to the pressure differential between the RCS (2,235 psig nominal per current operating data) and the SI pump shutoff pressure (1,565 psig per the SI pump curve). In addition, the setpoint of the discharge relief valve (EM8853B) to the Recycle Holdup Tank is 1,825 psig. Therefore, no inventory is lost from the RWST. With the SI pump operating with no flow, damage to the pump could occur, which is a commercial concern only since the SI pump is not credited in the PFSSD analysis. If necessary, the pump can be stopped by opening breaker NB0202, but this action is not required for PFSSD.

Based on the above discussion, spurious operation of the Train B SI pump will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13EM01, E-1F9102, E-1F9302, M-12EM01, WCRE-01

5.2.12 Containment Spray Pumps

Spurious start of the containment spray (CS) pumps may complicate PFSSD due to the possible depletion of inventory in the RWST. Therefore, a spurious start of the CS pumps should be avoided or mitigated. A control cable (14ENB01BB) associated with the Train B CS pump motor DPEN01B runs through area C-11 and could cause a spurious start of the pump. The cable damage could prevent stopping the pump from the control room.

If the Train B CS pump spuriously starts, normally closed valve ENHV0012 will remain closed, since a spurious containment spray actuation signal (CSAS) is not credible for a fire in area C-11. In addition, cables associated with valve ENHV0012 do not run in area C-11. Therefore, if the CS pump operates, inventory will not be lost from the RWST. If necessary, the pump can be stopped by opening breaker NB0203, but this action is not required for PFSSD.

Based on the above discussion, spurious operation of the Train B CS pump will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13EN01, E-13EN03, E-1F9102, E-1F9302, M-12EN01

5.2.13 Control Room Air Conditioning

Control room air conditioning is required to be available to satisfy the PFSSD support function. Two redundant and independent air conditioning units (SGK04A and SGK04B) are provided to satisfy this function. At least one unit is required to be available for PFSSD.

The power cable (14GKG02BA) that supplies 480 VAC power to panel GK199C runs in this area. Panel GK199C is the power and control panel for Train B control room A/C unit SGK04B. Damage to this cable will prevent operation of SGK04B.

Control cables 14GKY02BA, 14GKY02BB, 14GKY02BC, 14GKY02BD and 14GKY02BE, associated with control room A/C unit SGK04B supply and return dampers GKHZ0040A and GKHZ0040B, are run in this area. Damage to these cables could prevent operation of the dampers.

The Train A control room A/C unit SGK04A is unaffected by a fire in this area. Therefore, control room air conditioning is available if a fire occurs in area C-11.

References: XX-E-013, E-15000, E-13GK02A, E-13GK02C, E-13GK02D, E-1F9442, M-12GK01

5.2.14 Class 1E Electrical Equipment Air Conditioning

The PFSSD support function requires Class 1E electrical equipment air conditioning on the operating train of equipment. Class 1E electrical equipment air conditioning is provided by units SGK05A (Train A) and SGK05B (Train B).

Power cable 14GKG13BA and control cables 14GKG13BG and 14GKG13BH associated with Train B class 1E electrical equipment room A/C unit SGK05B are run in area C-11. Damage to these cables could prevent operation of the unit. Therefore, SGK05B is unavailable if a fire occurs in area C-11.

Power and control cables associated with Train A class 1E electrical equipment room A/C unit SGK05A are unaffected by a fire in this area.

References: XX-E-013, E-15000, E-13GK13A, E-1F9444, M-12GK03

5.2.15 Standby Diesel Generation

PFSSD requires at least one source of electrical power to energize credited PFSSD equipment. The electrical power sources credited for PFSSD include offsite power, where an evaluation shows offsite power is not lost due to a fire, and onsite power using the emergency diesel generators.

Calculation XX-E-013 documents a loss of off-site power evaluation that identifies the fire areas in and around the plant in which a fire could cause a loss of offsite and onsite power. Per XX-E-013 and Section 5.2.16 of this evaluation, a fire in area C-11 could cause a loss of both trains of off-site power and Train B on-site power sources.

Several cables (See Table C-11-3) associated with the Train B diesel engine as well as supporting functions are run in area C-11. Damage to these cables could prevent operation of the Train B diesel engine. The Train A diesel engine/generator is unaffected by a fire in area C-11 and is available to energize PFSSD equipment supplied by NB01.

Based on the above discussion, the Train A emergency diesel generator is available if a fire occurs in area C-11.

References: XX-E-013, E-15000, E-12KJ01, E-13GM01A, E-13GM04A, E-13JE01, E-13JE01A, E-13JE04, E-13KJ03A, E-13NE02, E-13NE11, E-13NE13, E-1F9444, E-1F9411B, E-1F9412B, E-1F9423, E-1F9426, M-12GM01, M-12JE01, M-12KJ04, M-12KJ05, M-12KJ06

5.2.16 Class 1E 4.16 kV Offsite Power

PFSSD requires at least one source of electrical power to energize credited PFSSD equipment. The electrical power sources credited for PFSSD include offsite power, where an evaluation shows offsite power is not lost due to a fire, and onsite power using the emergency diesel generators.

Bus NB02 supplies power to Train B Engineered Safety Features (ESF) components. Cables associated with offsite power feeder breakers NB0209 and NB0212 are run in this area. In addition, cables associated with NB02 breaker control power are run in this area. Damage to these cables due to a fire could cause a loss of offsite power to NB02 and could prevent operation of the PFSSD equipment supplied by NB02. As stated in Section 5.2.15, the Train B emergency diesel generator may not be available if a fire occurs in this area.

Cables associated with transformers XNB01 and XNB02 lockout and phase differential relays are run in fire area C-11. Damage to these cables could cause a loss of offsite power on both trains.

Control cables associated with bus NB02 Synchro-scope and associated switches are run in area C-11. Damage to these cables could disable the synchro-scope for NB02, but would not cause a loss of the NB02 bus.

As stated in Section 5.2.15, Train A emergency diesel generator is available and can be lined up to NB01 to provide power to Train A PFSSD loads. Therefore, a loss of offsite power on both trains due to a fire in area C-11 will not impact the ability to achieve and maintain safe shutdown. For a more detailed evaluation of offsite power availability, refer to Calculation XX-E-013, Appendix 2.

References: XX-E-013, E-15000, E-13NB03, E-13NB04, E-13NB05, E-13NB06, E-13NB10, E-13NB11, E-13NB14, E-13NB15, E-1F9102, E-1F9423, E-1F9425, E-1F9426

5.2.17 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

Cables 14NFK01CA and 14NFK01DA associated with one of the four UV relays on each bus are run in fire area C-11. Also, cables 14NFY01EA and 14NFY01FA associated with one of the four degraded voltage PTs on each bus are run in fire area C-11. Cables associated with the remaining three UV relays and PTs do not run in fire area C-11. Therefore, automatic functioning of the bus NB01 and NB02 emergency load shedder/sequencer is unaffected by a fire in area C-11 and a spurious start of the associated diesel generator due to a false undervoltage condition on two of the four circuits is not credible.

Based on the above discussion, the Train A and Train B load shedders/sequencers are unaffected by a fire in area C-11.

References: XX-E-013, E-15000, E-11NB01, E-11NB02, E-12NF01, E-13NF01, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, E-1F9402A, E-1F9402B, E-1F9403, E-1F9425, E-1F9426

5.2.18 Train B 480 Volt Class 1E Load Centers

The 480 Volt Class 1E load centers are required to supply power to PFSSD equipment.

Cables associated with Train B 480 VAC Class 1E load centers NG02, NG04 and motor control center (MCC) NG06E are run in area C-11. In addition, as stated in other sections, loss of power to these load centers and MCCs could occur due to loss of Train B offsite and onsite power. Therefore, Train B load centers and MCCs and associated equipment may not be available if a fire occurs in this area.

Cables 14NGG01AJ and 14NGG01BF supply power to MCCs NG02T and NG04T which power containment cooler fan motors DSGN01B and DSGN01D. Damage to these cables could prevent operation of the fans. Containment cooler fans SGN01A and SGN01C are unaffected. Therefore, sufficient containment cooling will be available.

Cable 14PKK11AA is associated with 480 VAC breaker NG0409. NG0409 supplies 480 VAC power to Train B 125 VDC battery charger PK22, which energizes the PK02 bus. Damage to this cable could disable power to the battery charger but will not de-energize PK02 due to the installed batteries. Battery set PK12 will provide short-term 125 VDC power to PK02. In addition, PK01 is unaffected by a fire in this area.

Redundant Train A components, supplied by NG01, NG03 and MCC NG05E are unaffected by a fire in area C-11. Therefore, loss of power to Train B 480 VAC Class 1E load centers NG02, NG04 and MCC NG06E will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11NG02, E-13NG01A, E-13NG10A, E-13NG11A, E-13NG11B, E-13PK11, E-K3NG10A, E-1F9422C, E-1F9423, E-1F9424B, E-1F9424D, E-K3NG10A

5.2.19 Class 1E 120 VAC Electrical Distribution System

The Class 1E 120 VAC electrical distribution system provides power to vital instrumentation and control loads for shutdown and normal operation. Under normal conditions, the system is supplied by inverters connected to the 125 VDC NK battery system. Swing inverters allow the primary inverters to be taken out of service for maintainance or repair without disrupting power to the associated vital AC bus. In the event of a loss of power to the inverters, a backup source of power is automatically lined up. The backup power source originates from the 480 VAC electrical distribution system (NG).

Cable 14NNG01AA supplies 480 VAC power from NG0~~0~~2AFF3 to inverter NN14. Cable 14NNG01BA supplies 480 VAC power from NG02ABR1 to inverter NN12. Damage to these cables will disrupt the 480 VAC power source to inverters NN12 and NN14. The 480 VAC power supply to swing inverter NN16 is unaffected.

Cables 14NNK01MA and 14NNK01MB supply 125 VDC power from NK0403 to manual transfer switch NK80. Damage to these cables will disrupt the 125 VDC power supply from NK0403 to swing inverter NN16. The 125 VDC power supply from NK0203 to swing inverter NN16 is unaffected.

Cables 14NNY01HA and 14NNY01HB supply 120 VAC power from swing inverter NN16 to bus NN04 through a manual transfer switch in inverter NN14. Damage to these cables will disrupt the 120 VAC power supply from swing inverter NN16 to NN02. The 120 VAC power supply from inverter NN14 to bus NN04 is unaffected.

As stated in Section 5.2.18, a fire in area C-11 could cause a loss of Train A 480 VAC power. This would cause a loss of 480 VAC power to the Train B NK battery chargers (NK22, NK24 and NK26) which will cause a loss of normal power to the NK02 and NK04 busses. Batteries NK12 and NK14 are unaffected and can supply 125 VDC to busses NK02 and NK04 to provide power to inverters NN12 and NN14 for a limited time.

Train A vital 120 VAC distribution panels NN01 and NN03 are unaffected by a fire in area C-11. Therefore, in the event of a loss of Train B Class 1E 120 VAC electrical distribution system, the Train A Class 1E electrical distribution switchboards are available to supply redundant PFSSD loads.

Based on the above discussion, damage to cables and components associated with Train B vital 120 VAC distribution panels NN02 and NN04 will not adversely impact the ability to achieve and maintain safe shutdown in the event of a fire in area C-11.

References: XX-E-013, E-15000, E-13NN01, E-1F9421

5.2.20 Non-Class 1E 120 VAC Electrical Distribution System

The PFSSD function of the non-Class 1E 120 VAC electrical distribution system is to supply 120 VAC power to Main Control Boards (MCBs) RL017/RL018 and RL021/RL022. The power is split at the MCB to supply specific PFSSD components.

The PFSSD components that depend on non-class 1E 120 VAC power from RL017/RL018 are Residual Heat Removal (RHR) discharge valves EJHCV0606 (Train A) and EJHCV0607 (Train B). Non-class 1E switchboard panel PN07 supplies power from switch PN0736 to solenoid valve EJHY0606 via RL017/RL018. Solenoid valve EJHY0606 controls the position of EJHCV0606 using hand controller EJHIC0606. Non-class 1E switchboard panel PN08 supplies power from switch PN0833 to solenoid valve EJHY0607 via RL017/RL018. Solenoid valve EJHY0607 controls the position of EJHCV0607 using hand controller EJHIC0607.

The PFSSD components that depend on non-class 1E 120 VAC power from RL021/RL022 are temperature recorders BBTR0423, BBTR0433 and BBTR0443. Non-class 1E switchboard panel PN07 supplies power from switch PN0738 to temperature recorder BBTR0423 via RL021/RL022. Non-class 1E switchboard panel PN08 supplies power from switch PN0835 to temperature recorders BBTR0433 and BBTR0443 via RL021/RL022.

Cables 14PNG01AD and 14PNG01AE supply 480 VAC power from NG002BBF1 to 480/120V transformer XPN08A. Damage to either of these cables due to a fire in area C-11 will result in a loss of power to the transformer and loss of non-class 1E 120 VAC feed to PN08 from this power source. Cables associated with the alternate power feed to PN08 from PG20GER5 are unaffected by a fire in area C-11. Therefore, at least one source of power to PN08 is available.

Both power feeds to non-class 1E 120 VAC power to panel PN07 are unaffected by a fire in this area. Therefore, panels PN07 and PN08 and associated PFSSD loads are available if a fire occurs in area C-11.

References: XX-E-013, E-15000, E-13PN01, E-13PN01A, E-13RL04, E-13RL06, E-1F9201, E-1F9205, E-1F9421, E-1F9424E

5.2.21 Process Monitoring Instrumentation

Reliable process monitoring is required to achieve and maintain safe shutdown. Circuits for a number of process instruments are run in area C-11. These circuits run from various process monitoring panels to the auxiliary shutdown panel (ASP) and provide indication at the ASP for control outside the control room. Each cable, along with the effects of fire damage to the cable, is discussed below.

Cable 14SBS16AA provides RCS cold leg loop 2 wide range temperature indication at the ASP on indicator BBTI0423X. Damage to this cable could cause a false temperature indication at the ASP but will not cause a loss of indication in the control room. Therefore, damage to this cable will not adversely impact PFSSD.

Cables 14SBS16BA and 14SBS16YA are associated with steam generator D wide range level indicator AELI0504A located at the ASP. Damage to these cables could cause a false level indication at the ASP but will not cause a loss of indication in the control room. Therefore, damage to these cables will not adversely impact PFSSD.

Cable 14SBS16EA provides RCS hot leg loop 4 wide range temperature indication at the ASP on indicator BBTI0443A. Damage to this cable could cause a false temperature indication at the ASP but will not cause a loss of indication in the control room. Therefore, damage to this cable will not adversely impact PFSSD.

Cable 14SBS16NA provides RCS wide range pressure indication at the ASP on pressure indicator BBPI0406X. Damage to this cable could cause a false pressure indication at the ASP

but will not cause a loss of indication in the control room. Therefore, damage to this cable will not adversely impact PFSSD.

Cable 14SBS16XA provides steam generator B wide range level indication at the ASP on indicator AELI0502A. Damage to this cable could cause a false level indication at the ASP but will not cause a loss of indication in the control room. Therefore, damage to this cable will not adversely impact PFSSD.

Cable 14SBS16ZA provides pressurizer narrow range level indication at the ASP on indicator BBLI0460B. Damage to this cable could cause a false level indication at the ASP but will not cause a loss of indication in the control room. Therefore, damage to this cable will not adversely impact PFSSD.

Based on the above discussion, damage to process instrumentation cables due to a fire in area C-11 will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13AE08, E-13BB15, E-13BB16, E-13SB16, E-1F9201, E-1F9203, E-1F9301, M-12AE02, M-12BB01, M-12BB02, M-12BB04

5.2.22 Lockout Relay Panel RP335

Cable 14RPK09NA provides Class 1E 125 VDC power from NK4419 to panel RP335. Damage to this cable could disrupt power to the loads served by panel RP335, which could prevent operation of the associated equipment. The following table identifies the PFSSD equipment powered by this cable.

Panel RP335 PFSSD Relays	
Relay #	**Description**
86XRP5	Train B MDAFP from CST and ESW Supply Valves (ALHV0034 and ALHV0030)
86XRP6	ESW to TDAFP Supply Valve (ALHV0033)
86XRP7	Train B MDAFP (PAL01B)

As discussed in Section 5.2.4, Train A auxiliary feedwater is available and is unaffected by a fire in area C-11. Therefore, damage to cable 14RPK09NA will have no adverse impact on PFSSD.

Other cables associated with control room lockout relays are run in area C-11. Damage to these cables could prevent operation of associated equipment. Train A equipment, located in a separate fire area, is available and is unaffected by the fire.

References: XX-E-013, E-15000, E-13AL01B, E-13AL02B, E-13AL04B, E-13RP09, E-13RP15, E-093-00095, E-093-00096, E-1F9202, E-1F9204

5.2.23 Miscellaneous Control Room Panels

Cable 14RPY09GA provides 120 VAC power to panel RP147B. Cable 14RPY10BA provides 120 VAC power to panel RP068. The following table identifies the PFSSD components that could be affected by a loss of Train B 120 VAC power to these panels.

Cable	Power Supply	Affected Components
14RPY09GA	NN0404	ABHS0004, ABPIC0004B, ABPT0004, ABPY0004, ALFT0001, ALFY0005B, ALHK0005A, ALHK0005B, ALHK0010A, ALHK0010B, ALHS0005, ALHS0010, ALHV0010, ALHY0010, ALPI0024B, ALPT0024, RP118B
14RPY10BA	NG02ACR136	GDHIS0011A (CGD01B)

All affected components listed in the above table are associated with Train B. Loss of power to these components will not adversely impact PFSSD. Redundant Train A components are unaffected by the fire or the component fails in the desired PFSSD position.

References: XX-E-013, E-15000, E-13AL03B, E-13AL05B, E-13AL07B, E-13AL09, E-13AB20B, E-13RP09, E-13RP10, E-1F9101, E-1F9202, E-1F9203, E-1F9204, E-1F9443, E-K3GD01A, J-110-00592, J-110-00593, J-110-00596, M-12AB01, M-12AL01, M-K2GD01

5.2.24 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs.

One control cable associated with reactor coolant pumps C and D is run in fire area C-11. Damage to these cables in the event of a fire could prevent operators from stopping the C and D RCPs from the control room. However, a fire in C-11 will not cause a loss of all seal cooling since RCP seal injection and thermal barrier cooling remain available.

Based on the above discussion, the inability to trip the C and D RCPs from the control room will have no adverse impact on PFSSD. The pumps can continue to operate, providing forced flow circulation. If the pumps spuriously stop, natural circulation cooldown can be used.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1

5.2.25 Steam Generator Feedwater Pumps

Main feedwater pump steam supply valves FCFV0005 and FCFV0105 are credited in the PFSSD analysis to trip the main feedwater pumps if the main steam isolation valves (MSIVs) are affected by a fire. Closing the MSIVs stops steam flow to the feedwater pumps' turbines and stops the feedwater pumps. The steam generator feedwater pumps are tripped in the event of a fire to prevent overfilling the steam generators.

Non-Class 1E 120 VAC Inverter PN10 and distribution panel PN10A provide power to FCFV0105 trip relays in panel FC170C. Cable 16RPY10AA supplies power from PN0806 to inverter PN10. Cable 16FCY35AA provides the primary source of 120 VAC power from distribution panel PN010A to panel FC170A. The alternate source of power to panel FC170A is not credited for PFSSD and is assumed lost.

A fire in area C-11 could damage cables 16FCY35AA or 16RPY10AA. If this occurs, operators in the control room would not be able to close valve FCFV0105 to stop steam flow to steam generator feedwater pump PAE01B.

A fire in area C-11 will not affect the ability to close the MSIVs from the control room. All-close hand switches ABHS0079 and ABHS0080 are unaffected and can be used to close the MSIVs from the control room.

Based on the above discussion, valve FCFV0105 may not close if a fire occurs in this area. However, the MSIVs can be closed using either hand switch ABHS0079 or ABHS0080 in the main control room. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-13FC35, E-13RP10, E-1F9103, E-1F9421

5.2.26 Load Center Feeder Breaker PA0207

Load center feeder breaker PA0207 is credited for PFSSD because it supplies power to credited non-safety related loads. Cable 16PGA11AC, associated with PA0207, runs in this area. A fire induced short circuit in this cable will trip the associated breaker.

Breaker PA0207 supplies power to the following PFSSD components:

- PG20GBR217 – MCB Misc. Power Circuits RL023
- PG20GER5 – Instr. Bus Transformer Alt. Feed XPN08D

PFSSD components powered from PG20GBR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG20GER5 is credited as one source of power to PN08. The redundant source of power from NG02BBF1 may also be affected by a fire in this area as discussed in Section 5.2.18. Redundant components powered from inverter PN07 are unaffected by a fire in this area.

Based on the above discussion, loss of breaker PA0207 will not adversely affect PFSSD if a fire occurs in this area.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-11PK02, E-13PG10, E-13PG11, E-13RL07, E-13SC12, E-1F9421, E-1F9422C, KD-7496, DCP 13324

5.2.27 CVCS Heat Tracing

Heat tracing has been installed to maintain the emergency borate line and other fluid lines above the solidification temperature in the Train A SI pump room. Both safety trains can power the heat tracing; an automatic transfer switch (QJS0001) switches from Train A (primary source) to Train B (alternate source) on loss of A Train.

Fire area C-11 contains one cable (14NGY13BA) associated with the CVCS heat tracing system. Damage to this cable will affect the secondary power feed to the heat tracing system but the primary power feed is unaffected. Therefore, CVCS heat tracing is not affected by a fire in this area.

References: E-15000, XX-E-013, E-13NG13, DCP 13130

FIRE AREA C-12

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-12 is located on the 2000 elevation of the Control Building and includes the room listed in Table C-12-1.

Table C-12-1
Rooms Located in Fire Area C-12

ROOM #	DESCRIPTION
3306	North Electrical Chase - 2000 Elevation

Fire area C-12 is protected with an automatic wet-pipe sprinkler system and automatic fire detection. The area is separated from adjacent areas by minimum 3-hour fire resistant construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-12-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-12-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-12

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
AL	Aux. Feedwater System	H, P	Train A motor driven auxiliary feedwater pump (MDAFP) PAL01A may be affected. Train B MDAFP and the TDAFP are available.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
BB	Reactor Coolant System	R, M, H, P, S	Train A pressurizer PORV block valve BBHV8000A may not be isolable from the control room. Pressurizer PORV BBPCV0455A is unaffected and will remain operable. Reactor coolant pumps A and B may not stop using the control room hand switch. RCP seal injection and thermal barrier cooling remain available. Therefore, the inability to stop the RCPs will have no adverse impact on PFSSD. Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, pressurizer spray can be stopped by closing KAFV0029 using KAHIS0029 in the main control room. Pressurizer pressure indication is available using BBPI0455A, BBPI0456, BBPI0457 or BBPI0458.
BG	Chemical and Volume Control System	R, M, S	A number of Train A components in the CVCS may be affected. Redundant Train B CVCS components are unaffected. Letdown isolation valves BGLCV0459 and BGLCV0460 and letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C may need to be failed closed by closing valve KAFV0029 using KAHIS0029 in the main control room.
BM	Steam Generator Blowdown System	R, M, H	The ability to isolate blowdown from Radwaste control room panel BM157 may be affected. Blowdown can be isolated using handswitches in the main control room.
BN	Borated Refueling Water Storage System	R, M, H	Valve BNHV8812A may be affected and may not be isolable from the control room. RWST draindown is prevented by maintaining valve EJHV8811A closed. Train B RWST components are unaffected. Valve BNLCV0112D may be affected. Redundant Train B valve BNLCV0112E is available to ensure a suction source from the RWST to the Train B charging pump.
EF	Essential Service Water System	H, S	Train A ESW may be affected, however Train B ESW is available.

Table C-12-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-12

System	System Name	PFSSD Function*	Comments
EG	Component Cooling Water System	S	Train A CCW may be affected, however Train B CCW is available.
EJ	Residual Heat Removal System	M, H, P	The Train A RHR system may not be available, however the Train B RHR system is unaffected.
EM	High Pressure Coolant Injection	R, M	The Train A SI Pump may spuriously start but the spurious actuation will not adversely impact PFSSD since the pump will be dead headed against RCS pressure. Therefore, no inventory will be lost from the RWST. In this condition, the pump could experience cavitation damage but this is a commercial concern, not a PFSSD concern. Operators can disconnect power to the pump by opening breaker NB0103, but this action is not required for PFSSD. SI test line valve EMHV8882 could be affected. Redundant valves downstream of this valve are unaffected and are available to isolate the SI test line.
EN	Containment Spray	R, M	The Train A containment spray pump may spuriously start but valve ENHV0006 will remain closed to prevent flow of water to the nozzles. Therefore, spurious actuation of the containment spray pump will not adversely impact PFSSD. The pump can be stopped by opening breaker NB0202, but this action is not required for PFSSD.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
GD	ESW Pump House HVAC	S	Train A ESW pump room ventilation may be affected. Train B ESW pump room ventilation is unaffected.
GF	AFW Pump Room Coolers	S	Train A AFW room cooler SGF02A may be affected. Train B AFW room cooler SGF02B is unaffected.
GK	Control Room and Class 1E Switchgear Room Coolers	S	Train A control room A/C unit SGK04A may be affected. Train B control room A/C unit SGK04B is unaffected. Train A Class 1E electrical equipment room A/C unit SGK05A may be affected. Train B Class 1E electrical equipment room A/C unit SGK05B is unaffected.

Table C-12-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-12

System	System Name	PFSSD Function*	Comments
GL	Auxiliary Building HVAC	S	Train A RHR pump room cooler SGL10A may be affected. Train B RHR pump room cooler SGL10B is unaffected. Train A centrifugal charging pump (CCP) room cooler SGL12A may be affected. Train B CCP room cooler SGL12B is unaffected. Train A component cooling water (CCW) room cooler SGL11A may be affected. Train B CCW room cooler SGL11B is unaffected.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
KJ	Standby Diesel Engine	S	Train A diesel engine KKJ01A may be affected by a fire in this area. Train B diesel engine KKJ01B is unaffected.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
NB	4.16 kV System	S	Train A Class 1E 4.16 kV switchgear bus NB01 may be affected. Train B Class 1E 4.16 kV switchgear bus NB02 is unaffected. Train A diesel generator output breaker NB0111 may be affected by a fire in this area. Train B diesel generator output breaker NB0211 is unaffected.
NE	Standby Diesel Generator	S	The Train A diesel generator exciter/voltage control cabinet NE107 could be affected. The Train B diesel generator exciter/voltage control cabinet NE106 is unaffected.
NF	Load Shed and Emergency Load Sequencing	S	The Train A emergency load sequencer inputs and outputs could be affected. The Train B emergency load sequencer inputs and outputs are unaffected.

Table C-12-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-12

System	System Name	PFSSD Function*	Comments
NG	480V Load Centers and MCCs	S	Train A 480 VAC load centers and motor control centers may be affected. Train B 480 VAC load centers and motor control centers are unaffected.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
NN	120VAC	S	Train A Class 1E 120 VAC electrical distribution system may be affected. The Train B Class 1E electrical distribution system is unaffected.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
PK	125VDC	S	125 VDC control power to breaker NG0102 could be affected and could disrupt 480 VAC power to PK21, causing a loss of the normal source of power to non-class 1E 125 VDC bus PK01. Non-class 1E 125 VDC bus PK02 is unaffected.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
PN	120VAC	S	Normal power to non-class 1E 120 VAC switchboard PN07 may be affected. However, the alternate power source to PN07 is unaffected. In addition, non-class 1E 120 VAC switchboard PN08 is unaffected.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
RP	Miscellaneous Control Panels	R, M, H, P, S	Power supply to Train A auxiliary relay panel RP139 may be affected. Redundant Train B auxiliary relay panel RP140 is unaffected and is available to support associated Train B components. Power to auxiliary relay panel RP211 may be affected, which will cause a loss of power to steam generator blowdown relay 3XBM46. Loss of power to this relay will not affect the ability to isolate blowdown from the main control room.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.

Table C-12-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-12			
System	**System Name**	**PFSSD Function***	**Comments**
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-12.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-12. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Component Cooling Water

Train A CCW could be affected by a fire in this area. If this occurs, swap to Train B CCW using normal operating procedures if Train B CCW is not already running.

3.2.2 Reactor Coolant Pump Seal Cooling

If Train A CCW is operating at the time of the fire, it could be lost causing a temporary loss of thermal barrier cooling. The normal charging pump is not analyzed and is assumed lost. Operators should swap to Train B CCW to restore thermal barrier cooling and line up the Train B CCP to restore RCP seal injection.

3.2.3 Normal Pressurizer Spray

Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, the spray can be stopped by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer pressure indication is available using BBPI0455A, BBPI0456, BBPI0457 and BBPI0458.

3.2.4 Isolation of Letdown

A fire in area C-12 could prevent valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B, and BGHV8149C from being closed using their associated control room hand switches. If this occurs, the valves can be closed by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer level indication is available using BBLI0459A and BBLI0460A.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

With one exception, redundant Post Fire Safe Shutdown capability exists if a severe fire occurs in area C-12. For the one exception, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-12.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-12

There are no PFSSD components located in area C-12. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-12-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-12. The applicable evaluation section is also listed in Table C-12-3.

Table C-12-3
PFSSD Cables Located in Fire Area C-12

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ALB01AB	3306	DPAL01A	C	5.2.1	AFW Pump A Motor
11ALB01AW	3306	DPAL01A	C	5.2.1	AFW Pump A Motor
11BBG39AF	3306	BBHV8000A	C	5.2.2	Pressurizer PORV BBPCV0455A Inlet Iso
11BBG39AJ	3306	BBHV8000A	C	5.2.2	Pressurizer PORV BBPCV0455A Inlet Iso
11BGB01AB	3306	DPBG05A	C	5.2.3	Train A CCP Motor
11BGG11CA	3306	BGHV8110	P	5.2.3	CCP A Mini-Flow Valve
11BGG11CB	3306	BGHV8110	C	5.2.3	CCP A Mini-Flow Valve
11BGG11CC	3306	BGHV8110	C	5.2.3	CCP A Mini-Flow Valve
11BGG11CD	3306	BGHV8110	C	5.2.3	CCP A Mini-Flow Valve
11BGG12AA	3306	BGLCV0112B	P	5.2.3	VCT Outlet Valve
11BGG12AB	3306	BGLCV0112B	C	5.2.3	VCT Outlet Valve
11BGG12AC	3306	BGLCV0112B	C	5.2.3	VCT Outlet Valve
11BGG12AD	3306	BGLCV0112B	C	5.2.3	BNLCV0112D Interlock
11BGG12AE	3306	BGLCV0112B	C	5.2.3	VCT Outlet Valve
11BGG52AA	3306	BGHV8357A	P	5.2.3	CCP A Discharge to RCP Seals
11BGG52AB	3306	BGHV8357A	C	5.2.3	CCP A Discharge to RCP Seals
11BGG52AC	3306	BGHV8357A	C	5.2.3	CCP A Discharge to RCP Seals
11BNG01AA	3306	BNLCV0112D	P	5.2.3	RWST to CCP A Suction Valve
11BNG01AB	3306	BNLCV0112D	C	5.2.3	RWST to CCP A Suction Valve
11BNG01AC	3306	BNLCV0112D	C	5.2.3	RWST to CCP A Suction Valve
11BNG01AD	3306	BNLCV0112D	C	5.2.3	RWST to CCP A Suction Valve
11BNG03AA	3306	BNHV8812A	P	5.2.4	RWST to RHR A Suction Valve
11BNG03AB	3306	BNHV8812A	C	5.2.4	RWST to RHR A Suction Valve

Table C-12-3
PFSSD Cables Located in Fire Area C-12

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BNG03AC	3306	BNHV8812A	C	5.2.4	RWST to RHR A Suction Valve
11BNG03AE	3306	BNHV8812A	C	5.2.4	RWST to RHR A Suction Valve
11EFB01SA	3306	DPEF01A	C	5.2.5	Train A ESW Pump Motor
11EFB01SB	3306	DPEF01A	C	5.2.5	Train A ESW Pump Motor
11EFB01SC	3306	DPEF01A	C	5.2.5	Train A ESW Pump Motor
11EFG02AA	3306	EFHV0023	P	5.2.5	ESW A/Service Water Cross Connect Valve
11EFG02AB	3306	EFHV0023	C	5.2.5	ESW A/Service Water Cross Connect Valve
11EFG02AC	3306	EFHV0023	C	5.2.5	ESW A/Service Water Cross Connect Valve
11EFG02AD	3306	EFHV0023	C	5.2.5	ESW A/Service Water Cross Connect Valve
11EFG02AE	3306	EFHV0023	C	5.2.5	ESW A/Service Water Cross Connect Valve
11EFG02AF	3306	EFHV0023	C	5.2.5	ESW A/Service Water Cross Connect Valve
11EFG02BA	3306	EFHV0024	P	5.2.5	ESW B/Service Water Cross Connect Valve
11EFG02BB	3306	EFHV0024	C	5.2.5	ESW B/Service Water Cross Connect Valve
11EFG02BC	3306	EFHV0024	C	5.2.5	ESW B/Service Water Cross Connect Valve
11EFG02BD	3306	EFHV0024	C	5.2.5	ESW B/Service Water Cross Connect Valve
11EFG02BE	3306	EFHV0024	C	5.2.5	ESW B/Service Water Cross Connect Valve
11EFG02BF	3306	EFHV0024	C	5.2.5	ESW B/Service Water Cross Connect Valve
11EFG02SD	3306	DFEF01A	C	5.2.5	ESW A Traveling Water Screen Motor
11EFG03CA	3306	EFHV0041	P	5.2.5	ESW A To Service Water Iso Valve
11EFG03CB	3306	EFHV0041	C	5.2.5	ESW A To Service Water Iso Valve
11EFG03CC	3306	EFHV0041	C	5.2.5	ESW A To Service Water Iso Valve
11EFG03CD	3306	EFHV0041	C	5.2.5	ESW A To Service Water Iso Valve
11EFG03CE	3306	EFHV0041	C	5.2.5	ESW A To Service Water Iso Valve

Table C-12-3
PFSSD Cables Located in Fire Area C-12

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EFG03DA	3306	EFHV0042	P	5.2.5	ESW A To Service Water Iso Valve
11EFG03DB	3306	EFHV0042	C	5.2.5	ESW A To Service Water Iso Valve
11EFG03DC	3306	EFHV0042	C	5.2.5	ESW A To Service Water Iso Valve
11EFG03DD	3306	EFHV0042	C	5.2.5	ESW A To Service Water Iso Valve
11EFG03DE	3306	EFHV0042	C	5.2.5	ESW A To Service Water Iso Valve
11EFG03SD	3306	EFHV0091	C	5.2.5	ESW Screen A Spray Valve
11EFG06AA	3306	EFHV0037	P	5.2.5	ESW A TO UHS
11EFG06AB	3306	EFHV0037	C	5.2.5	ESW A TO UHS
11EFG06AC	3306	EFHV0037	C	5.2.5	ESW A TO UHS
11EFG06SD	3306	EFHV0097	C	5.2.5	ESW Pump A Disch Air Release Vlv
11EFI08RB	3306	EFPT0001	I	5.2.5	ESW Pump 1A Discharge Pressure
11EFI11EA	3306	EFFT0053	I	5.2.5	ESW A Flow To Power Block
11EFK01SB	3306	EF155	C	5.2.5	Train A Essential Service Water Control Panel
11EGB01AB	3306	DPEG01A	C	5.2.6	CCW Pump A Motor
11EGB01AC	3306	DPEG01A	C	5.2.6	CCW Pump A Motor
11EGB01AD	3306	DPEG01A	C	5.2.6	CCW Pump A Motor
11EGB01AE	3306	DPEG01A	C	5.2.6	CCW Pump A Motor
11EGB01AG	3306	DPEG01A	C	5.2.6	CCW Pump A Motor
11EGB01AH	3306	DPEG01A	C	5.2.6	CCW Pump A Motor
11EGB01AK	3306	DPEG01A	C	5.2.6	CCW Pump A Motor
11EGB01AL	3306	DPEG01A	C	5.2.6	CCW Pump A Motor
11EGB01CB	3306	DPEG01C	C	5.2.6	CCW Pump C Motor
11EGB01CC	3306	DPEG01C	C	5.2.6	CCW Pump C Motor

Table C-12-3
PFSSD Cables Located in Fire Area C-12

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EGB01CD	3306	DPEG01C	C	5.2.6	CCW Pump C Motor
11EGB01CE	3306	DPEG01C	C	5.2.6	CCW Pump C Motor
11EGB01CG	3306	DPEG01C	C	5.2.6	CCW Pump C Motor
11EGG05CD	3306	EGHV0053	C	5.2.6	Train A CCW to Service Loop
11EJB01AB	3306	DPEJ01A	C	5.2.7	RHR Pump A Motor
11EJG08AB	3306	EJFCV0610	C	5.2.7	RHR A Mini Flow Valve
11EJG08AC	3306	EJFCV0610	C	5.2.7	RHR A Mini Flow Valve
11EJG08AD	3306	EJFCV0610	C	5.2.7	RHR A Mini Flow Indicating Sw (EJFIS0610)
11EJG08AE	3306	EJFCV0610	P	5.2.7	RHR A Mini Flow Valve
11EMB01AB	3306	DPEM01A	C	5.2.8	Train A Safety Injection Pump Motor
11EMG02CF	3306	EMHV8801A	C	5.2.23	Train A BIT Outlet Valve
11ENB01AB	3306	DPEN01A	C	5.2.9	Train A Containment Spray Pump Motor
11GDG01AC	3306	DCGD01A	C	5.2.5	Train A ESW Pump Room Supply Fan Motor
11GDI04AA	3306	GDTE0001	I	5.2.5	Train A ESW Pump Room Outside Air Damper
11GDI04AB	3306	GDTZ0001A	I	5.2.5	Train A ESW Pump Room Inlet Damper
11GDI04AC	3306	GDTZ0001B	I	5.2.5	Train A ESW Pump Room Recirc Damper
11GDY01AA	3306	CGD01A	C	5.2.5	Train A ESW Pump Room Supply Fan Motor
11GDY01AB	3306	CGD01A	C	5.2.5	Train A ESW Pump Room Supply Fan Motor
11GFG01AC	3306	DSGF02A	C	5.2.1	AFW Pump A Room Cooler Motor
11GKG02AA	3306	SGK04A	P	5.2.10	Train A Control Room A/C Unit
11GKG13AA	3306	SGK05A	P	5.2.11	Train A Class 1E Electrical Equip A/C Unit
11GKG13AG	3306	SGK05A	C	5.2.11	Train A Class 1E Electrical Equip A/C Unit
11GKG13AH	3306	SGK05A	C	5.2.11	Train A Class 1E Electrical Equip A/C Unit

Table C-12-3
PFSSD Cables Located in Fire Area C-12

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GKY02AA	3306	GKHZ0029A/B	C	5.2.10	Train A Control Room A/C Unit Dampers
11GKY02AB	3306	GKHZ0029B	C	5.2.10	Train A Control Room A/C Unit Disch Damper
11GKY02AC	3306	GKHZ0029A	C	5.2.10	Train A Control Room A/C Unit Supply Damper
11GKY02AD	3306	GKHZ0029A/B	C	5.2.10	Train A Control Room A/C Unit Dampers
11GKY02AE	3306	GKHZ0029A/B	P	5.2.10	Train A Control Room A/C Unit Dampers
11GKY02AF	3306	GKHZ0029A/B	P	5.2.10	Train A Control Room A/C Unit Dampers
11GLG05AA	3306	DSGL10A	P	5.2.7	RHR Pump A Room Cooler Motor
11GLG05GA	3306	DSGL12A	P	5.2.3	CCP Pump A Room Cooler Motor
11GLG06AD	3306	DSGL11A	C	5.2.6	Train A CCW Pump Room Fan Motor
11GLY27AB	3306	GLHZ0080	C	5.2.6	CCW A Pump Rm Cooler Exhaust Damper
11GLY27AD	3306	GLHZ0081	C	5.2.6	CCW A Pump Rm Cooler Exhaust Damper
11KJK01AA	3306	KKJ01A	P	5.2.12	Train A Diesel Engine
11NBB01AB	3306	NBHS0010	C	5.2.13	NB01 Synchro-scope/Selector Switch
11NBB01AD	3306	NBHS0010	C	5.2.13	NB01 Synchro-scope/Selector Switch
11NBB01AE	3306	NBHS0010	C	5.2.13	NB01 Synchro-scope/Selector Switch
11NBB02AC	3306	NB001	C	5.2.13	Bus NB01 Monitoring and Control
11NBB03BC	3306	NB001	C	5.2.13	Bus NB01 Monitoring and Control
11NBB12AA	3306	NB00112	C	5.2.13	Bus NB01 Incoming Feeder Breaker
11NBB12AB	3306	NB00112	C	5.2.13	Bus NB01 Incoming Feeder Breaker
11NBB12AC	3306	NB00112	C	5.2.13	Bus NB01 Incoming Feeder Breaker
11NBB12AD	3306	NB00112	C	5.2.13	Bus NB01 Incoming Feeder Breaker
11NBB12AE	3306	NB00112	C	5.2.13	Bus NB01 Incoming Feeder Breaker
11NBB12AF	3306	NB00112	C	5.2.13	Bus NB01 Incoming Feeder Breaker

Table C-12-3
PFSSD Cables Located in Fire Area C-12

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11NBB12AG	3306	NB00112	C	5.2.13	Bus NB01 Incoming Feeder Breaker
11NBB13AA	3306	NB00109	C	5.2.13	XNB02 to Bus NB01 Crosstie Feeder Breaker
11NBB13AC	3306	NB00109	C	5.2.13	XNB02 to Bus NB01 Crosstie Feeder Breaker
11NBK13AA	3306	NB001	P	5.2.13	NB01 Breaker DC Control Power
11NBK13AB	3306	NB001	P	5.2.13	NB01 Breaker DC Control Power
11NEB10AA	3306	NB00111	C	5.2.12	Train A EDG to NB01 Feeder Breaker
11NEB10AD	3306	NB00111	C	5.2.12	Train A EDG to NB01 Feeder Breaker
11NEK12AA	3306	NE107	P	5.2.12	Train A Diesel Gen Exciter Control
11NFK01CA	3306	NF039A	C	5.2.12	Load Shed / Sequencer Ch 1 Logic
11NFK01DA	3306	NF039B	C	5.2.12	Load Shed / Sequencer Ch 1 Logic
11NFY01EA	3306	NF039A	C	5.2.12	Load Shed / Sequencer Ch 4 Logic
11NFY01FA	3306	NF039B	C	5.2.12	Load Shed / Sequencer Ch 4 Logic
11NGB10AB	3306	NB00113	C	5.2.14	NG01 Feeder Breaker
11NGB10BB	3306	NB00110	C	5.2.14	NG03 Feeder Breaker
11NGB10SA	3306	NB00116	C	5.2.14	ESW Pump House NG05E Feeder Breaker
11NGB10SB	3306	NB00116	P	5.2.14	NG05E Incoming Main Feeder Breaker
11NGG01AD	3306	NG001B	P	5.2.14	NG01B Incoming Power Feed from NG0107
11NGG01AE	3306	NG001B	P	5.2.14	NG01B Incoming Power Feed from NG0107
11NGG01AJ	3306	NG001TAF1	P	5.2.14	NG01T Incoming Power Feed from NG0108
11NGG01BB	3306	NG003CAF1	P	5.2.14	NG03C Incoming Power Feed from NG0306
11NGG01BC	3306	NG003CAF1	P	5.2.14	NG03C Incoming Power Feed from NG0306
11NGG01BF	3306	NG003TAF1	P	5.2.14	NG03T Incoming Power Feed from NG0305
11NGG11AA	3306	NG00101	C	5.2.14	Bus NG01 Feeder Breaker Control

Table C-12-3
PFSSD Cables Located in Fire Area C-12

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11NGG11BA	3306	NG00301	C	5.2.14	Bus NG03 Feeder Breaker Control
11NGK11AA	3306	NG00101	P	5.2.14	Bus NG01 125 VDC Breaker Control Power
11NGK11AB	3306	NG00101	P	5.2.14	Bus NG01 125 VDC Breaker Control Power
11NGK11BA	3306	NG00301	P	5.2.14	Bus NG03 125 VDC Breaker Control Power
11NGK11BB	3306	NG00301	P	5.2.14	Bus NG03 125 VDC Breaker Control Power
11NNG01AA	3306	NN11	P	5.2.15	480 VAC Power to Inverter NN11
11NNG01CA	3306	NN13	P	5.2.15	480 VAC Power to Inverter NN13
11NNK01JA	3306	NN15	P	5.2.15	125 VDC Power to Swing Inverter NN15
11NNK01JB	3306	NN15	P	5.2.15	125 VDC Power to Swing Inverter NN15
11NNY01EA	3306	NN11	P	5.2.15	120 VAC Power from NN15 to NN11
11NNY01EB	3306	NN11	P	5.2.15	120 VAC Power from NN15 to NN11
11PKK10AA	3306	PK21	C	5.2.14	NG0102 Breaker Control
11PKK10AB	3306	PK21	C	5.2.14	NG0102 Breaker Control
11PNG01AD	3306	PN07	P	5.2.16	Non-Class 1E Electrical Equipment AC Distribution Panel
11PNG01AE	3306	PN07	P	5.2.16	Non-Class 1E Electrical Equipment AC Distribution Panel
11RPK09AA	3306	RP139	P	5.2.17	Auxiliary Relay Rack
11RPY09BA	3306	RP139	P	5.2.17	Auxiliary Relay Rack
11RPY10BA	3306	NG01ACR142	P	5.2.5	120 VAC Feed to BOP Control Panel RP068
15BBA01AC	3306	DPBB01A	C	5.2.21	Reactor Coolant Pump A Motor
15BBA01BC	3306	DPBB01B	C	5.2.21	Reactor Coolant Pump B Motor
15BBI19AA	3306	BBPCV0455B	I	5.2.22	Pressurizer Spray Valve

Table C-12-3
PFSSD Cables Located in Fire Area C-12

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15BBI19BA	3306	BBPCV0455C	I	5.2.22	Pressurizer Spray Valve
15BGK10AA	3306	BGLCV0459	C	5.2.18	Letdown Isolation Valve
15BGK10AD	3306	BGLCV0459	C	5.2.18	Letdown Isolation Valve
15BGK10BA	3306	BGLCV0460	C	5.2.18	Letdown Isolation Valve
15BGK10BD	3306	BGLCV0460	C	5.2.18	Letdown Isolation Valve
15BGK35AB	3306	BGHV8149A	C	5.2.18	Letdown Orifice Isolation Valve
15BGK35AD	3306	BGHV8149A	C	5.2.18	Letdown Orifice Isolation Valve
15BGK35BB	3306	BGHV8149B	C	5.2.18	Letdown Orifice Isolation Valve
15BGK35BD	3306	BGHV8149B	C	5.2.18	Letdown Orifice Isolation Valve
15BGK35CB	3306	BGHV8149C	C	5.2.18	Letdown Orifice Isolation Valve
15BGK35CD	3306	BGHV8149C	C	5.2.18	Letdown Orifice Isolation Valve
15BMK06AB	3306	BMHV0001	C	5.2.19	SG A to Blowdown Flash Tank Isolation Valve
15BMK06BB	3306	BMHV0002	C	5.2.19	SG B to Blowdown Flash Tank Isolation Valve
15BMK06CB	3306	BMHV0003	C	5.2.19	SG C to Blowdown Flash Tank Isolation Valve
15BMK06DB	3306	BMHV0004	C	5.2.19	SG D to Blowdown Flash Tank Isolation Valve
15EMK05EA	3306	EMHV8882	C	5.2.20	Boron Injection Downstream Test Line Iso Vlv
15NBA10AA	3306	NB00112	C	5.2.13	Bus NB01 Incoming Feeder Breaker
15NBA10AD	3306	NB00112	C	5.2.13	Bus NB01 Incoming Feeder Breaker
15NBB03AJ	3306	NB00112	P	5.2.13	Bus NB01 Incoming Feeder Breaker
15RPK09EA	3306	RP211	P	5.2.19	Auxiliary Relay Rack

5.2.1 Auxiliary Feedwater

The auxiliary feedwater (AFW) system is required to feed at least two steam generators to ensure PFSSD. The Train A motor driven auxiliary feedwater pump (MDAFP) supplies AFW to steam generators B and C. The Train B MDAFP supplies AFW to steam generators A and D. The turbine driven auxiliary feedwater pump (TDAFP) supplies AFW to all four steam generators.

Cables associated with Train A MDAFP PAL01A are run in this area. Damage to these cables could prevent operation of the pump. Cables associated with redundant Train B MDAFP PAL01B and the TDAFP are run in a different area. Therefore, the Train B MDAFP and TDAFP are available if a fire occurs in this area.

Cable 11GFG01AC is associated with Train A MDAFP room cooler fan motor DSGF02A. Damage to this cable could prevent automatic start of the fan when the Train A MDAFP starts. The Train B MDAFP room cooler DSGF02B is unaffected by a fire in area C-12.

References: E-15000, XX-E-013, E-13AL01A, E-13GF01, E-1F9204, E-1F9202, E-1F9444, M-12AL01, M-12GF01

5.2.2 Pressurizer Power Operated Relief Valves and Associated Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed. Cables associated with block valve BBHV8000A are run through area C-12. Damage to these cables could prevent closing the valve from the control room. Cables and components associated with PORV BBPCV0455A are not located in area C-12. Therefore, the PORV will remain operable if a fire occurs in this area.

References: E-15000, XX-E-013, E-13BB39, E-13BB40, E-1F9301, M-12BB02

5.2.3 Centrifugal Charging System

At least one centrifugal charging pump (CCP) is required for PFSSD to provide RCP seal cooling, reactivity control and inventory control. These functions are accomplished using a CCP taking suction from the refuelling water storage tank (RWST) and injecting through the RCP seals. RCP seal injection provides approximately 20 gpm makeup to the RCS and provides adequate boron concentration to maintain sub-critical reactivity conditions. If RCP seal injection is unavailable, reactivity and inventory control is provided by lining up the CCPs to the boron injection tank (BIT). The normal charging pump (NCP) is not credited and is assumed lost.

Power and control cables associated with Train A CCP are run through area C-12. Damage to these cables could prevent operation of the pump. Redundant Train B CCP cables are run in a separate fire area and are unaffected by a fire in area C-12.

Power and control cables associated with Train A CCP miniflow valve BGHV8110 are run through area C-12. Redundant Train B cables for miniflow valve BGHV8111 are run in a separate fire area and are unaffected by a fire in area C-12.

Power and control cables associated with Train A CCP room cooler SGL12A are run in area C-12. Damage to these cables will prevent operation of the room cooler. Train B CCP room cooler SGL12B circuits are run in a separate fire area and are unaffected by a fire in area C-12.

Power and control cables associated with VCT valve BGLCV0112B run through fire area C-12. Cable damage due to a fire could bypass the BNLCV0112D interlock and cause inadvernent closure of BGLCV0112B. If this occurs prior to establishing suction from the RWST, damage to the operating charging pump could occur due to loss of suction. Calculation XX-E-013,

assumption 3-A-22, states that systems and components are in their normal operating position or status prior to the fire. The Normal Charging Pump (NCP) is the normally operated pump and is assumed to be operating at the time of the fire. Inadvertent closure of valve BGLCV0112B with no suction from the RWST would result in damage to the NCP but the centrifugal charging pumps would remain unaffected. Cables for redundant VCT valve BGLCV0112C are run in a separate fire area and are unaffected by a fire in area C-12.

Power and control cables associated with Train A RCP seal injection flow throttling valve BGHV8357A are run in area C-12. Damage to these cables will prevent operation of the valve from the control room. Cables associated with redundant Train B valve BGHV8357B are run in a separate fire area and are unaffected by a fire in area C-12.

Based on the above discussion, the Train A CCP could be affected but the Train B CCP is available if a fire occurs in area C-12.

References: E-15000, XX-E-013, E-13BG01, E-13BG01A, E-13BG11B, E-13BG12, E-13BG12A, E-13BG52, E-13BN01, E-13GL05, E-1F9102, E-1F9302, E-1F9401A, E-1F9444, M-12BG03, M-12BN01, M-12GL01

5.2.4 RWST to RHR Suction

The RWST is required for PFSSD to ensure an adequate volume of borated water to achieve cold shutdown. Cables associated with RWST to RHR Train A suction valve BNHV8812A are located in this area. Damage to these cables could prevent the valve from closing in response to a signal from the control room, or could cause the valve to spuriously close. Either this valve or containment sump isolation valve EJHV8811A is required to be closed to prevent draindown of the RWST into the containment sump. If using Train A RHR for cold shutdown, valve BNHV8812A is required to be closed.

Cables associated with containment sump isolation valve EJHV8811A are not run in area C-12. Therefore, draindown of the RWST into the containment sump is not a concern. The Train B RHR system is available if a fire occurs in this area, so valve BNHV8812A is not required to be closed.

References: E-15000, XX-E-013, E-13BN03, E-13EJ06A, E-1F9102, E-1F9205, M-12BN01, M-12EJ01

5.2.5 Essential Service Water System

One train of Essential Service Water (ESW) is required to be operable to ensure adequate cooling for essential equipment. A number of cables associated with Train A ESW and Train A ESW pump room cooler are run in this area. Therefore, Train A ESW cannot be relied on for PFSSD if a fire occurs in this area. Cables associated with Train B ESW are run in a different fire area and Train B ESW is available if a fire occurs in area C-12.

Valve EFHV0023 is a normally open isolation valve on the service water system feed to the Train A Essential Service Water System. Either this valve or valve EFHV0025 is required to be closed when operating the Train A ESW system for PFSSD. Power and control cables associated with EFHV0023 are run in this area. Damage to these cables could prevent closing EFHV0023 from the control room. Redundant valve EFHV0025 is unaffected by a fire in area C-12 and can be closed from the control room to isolate this flowpath. In addition, check valve EFV0470 is installed in this line and will prevent flow diversion in the unlikely event valve EFHV0025 cannot be closed.

Valve EFHV0024 is a normally open isolation valve on the service water system feed to the Train B Essential Service Water System. Either this valve or valve EFHV0026 is required to be closed when operating the Train B ESW system for PFSSD. Power and control cables associated with EFHV0024 are run in this area. Damage to these cables could prevent closing

EFHV0024 from the control room. Redundant valve EFHV0026 is unaffected by a fire in area C-12 and can be closed from the control room to isolate this flowpath. In addition, check valve EFV0471 is installed in this line and will prevent flow diversion in the unlikely event valve EFHV0026 cannot be closed.

Valve EFHV0041 is a normally open isolation valve on the return line from the Train A Essential Service Water System to the service water system. Either this valve or valve EFHV0039 is required to be closed when operating the Train A ESW system for PFSSD. Power and control cables associated with EFHV0041 are run in this area. Damage to these cables could prevent closing EFHV0041 from the control room. Redundant valve EFHV0039 is unaffected by a fire in area C-12 and can be closed from the control room to isolate this flowpath.

Valve EFHV0042 is a normally open isolation valve on the return line from the Train B Essential Service Water System to the service water system. Either this valve or valve EFHV0040 is required to be closed when operating the Train B ESW system for PFSSD. Power and control cables associated with EFHV0042 are run in this area. Damage to these cables could prevent closing EFHV0042 from the control room. Redundant valve EFHV0040 is unaffected by a fire in area C-12 and can be closed from the control room to isolate this flowpath.

Valve EFHV0037 is the Train A return isolation valve from ESW to the Ultimate Heat Sink. This valve is required to be open when operating the Train A ESW system for PFSSD. Since the Train A ESW system may not be available if a fire occurs in area C-12, Train B return isolation valve EFHV0038 from ESW to the Ultimate Heat Sink will be used. Circuits for EFHV0038 are not run in area C-12 and will be unaffected by the fire.

Cable 11RPY10BA supplies 120 VAC control power to the automatic and manual start circuits for the Train A ESW pump room supply fan CGD01A. The control power is supplied via this cable to control room panel RP068 and is distributed to a number of fuse blocks including 1FU3, which provides circuit protection for CGD01A control power. If power is lost to the control circuit due to damage to this cable, then the Train A ESW pump room supply fan will not start either automatically, when the ESW pump starts, or manually from the control room. If this occurs, the Train B ESW pump room supply fan remains unaffected by a fire in this area.

Cable 11GDG01AC is associated with the indicator lights on Train A ESW pump room supply fan CGD01A hand switch GDHIS0001B. Damage to this cable could prevent operation of the fan. Cables for Train B ESW pump room supply fan CGD01B are unaffected by a fire in this area.

Cable 11GDI04AA provides ESW A room temperature from temperature element GDTE0001 to temperature controller GDTC0001. Cables 11GDI04AB and 11GDI04AC provide signals from GDTC0001 to outside air intake damper GDTZ0001A and recirculation damper GDTZ0001B, respectively, to change position based on room temperature. Damage to these cables could prevent operation of the dampers. Temperature controls for Train B ESW pump room are unaffected by a fire in area C-12.

PFSSD is assured for a fire in area C-12 using Train B ESW pump PEF01B and associated components.

References: E-15000, XX-E-013, E-13EF02, E-13EF03, E-13EF06, E-13EF11, E-13RP10, E-K3EF01, E-K3EF02, E-K3EF03, E-K3EF06, E-K3EF08, E-K3GD01, E-K3GD01A, E-K3GD04, E-1F9402A, E-1F9402B, E-1F9403, E-1F9443, J-201-00139, M-12EF01, M-12EF02, M-K2EF01, M-K2GD01

5.2.6 Component Cooling Water

For PFSSD, the component cooling water (CCW) system is used to provide cooling to the centrifugal charging pump (CCP) oil cooler, the seal water heat exchanger, the RHR heat exchanger and the RHR pump seal cooler. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Cables associated with Train A CCW pumps PEG01A and PEG01C are run in this area. In addition, cables associated with Train A CCW pump room cooler SGL11A and associated dampers are run in this area. Damage to these cables could prevent operation of the Train A CCW system.

Cable 11EGG05CD, associated with Train A CCW valve EGHV0053, is run in this area. This cable supplies power to auxiliary relay 3XEG9 which provides permissives to open or close valves in the CCW supply to and from the Radwaste building. If Train A CCW is operating at the time of the fire, valve EGHV0053 will be open. Damage to cable 11EGG05CD could cause the control power fuse to blow and prevent closure of EGHV0053 when lining up Train B CCW. A loss of power to NB01, which is possible if a fire occurs in this area, could also prevent closure of valves EGHV0015 and EGHV0053. Operation of Train B CCW with valves EGHV0015 and EGHV0053 open could cause Train B CCW flow to divert to Train A CCW system. Per calculation M-EG-24, the system will continue to operate with no damage to the pumps if the valves in the opposite train are open.

Control cables associated with Train A CCW Pump Room cooler exhaust dampers GLHZ0080 and GLHZ0081 are run in area C-9. Damage to these cables could prevent operation of the dampers. There are no exhaust dampers associated with Train B CCW pump room cooler.

Cables associated with Train B CCW system are unaffected by a fire in this area. Therefore, the Train B CCW system can be used to supply cooling water to associated Train B equipment.

References: E-15000, XX-E-013, E-13EG01A, E-13EG01B, E-13EG05B, E-13GL06, E-13GL27, E-1F9401A, E-1F9444, M-12EG01, M-12GL01, Calculation M-EG-24

5.2.7 Residual Heat Removal

Cables associated with Train A residual heat removal (RHR) system are run in area C-12. In addition, cables associated with RHR Train A pump room cooler motor DSGL10A are run in this area. Damage to these cables could prevent operation of the Train A RHR system. Cables associated with Train B RHR are run in a different fire area and are unaffected by a fire in area C-12.

The Train B RHR system is available and can be used to achieve cold shutdown if a fire occurs in area C-12.

References: E-15000, XX-E-013, E-13EJ01, E-13EJ08, E-13GL05, E-1F9205, E-1F9401A, E-1F9444, M-12EJ01, M-12GL01

5.2.8 Safety Injection Pumps

The PFSSD strategy is to prevent operation of the Safety Injection (SI) pumps to ensure an adequate supply of borated water in the RWST. A control cable (11EMB01AB) associated with Train A SI pump is run in area C-12. Damage to this cable could cause the spurious start of the pump and could prevent stopping the pump from the control room.

If the Train A SI pump spuriously starts with the reactor at normal pressure, PFSSD will be assured. The pump will not discharge into the RCS due to the pressure differential between the RCS (approximately 2,235 psig) and the SI pump shutoff pressure (approximately 1,565

psig). In addition, the setpoint of the discharge relief valve (EM8853A) to the Recycle Holdup Tank is 1,825 psig. Therefore, no inventory will be lost from the RWST if the SI pumps spuriously start. With the SI pump operating at zero flow, damage to the pump could occur, which is a commercial concern only since the SI pump is not credited in the PFSSD analysis. If necessary, the pump can be stopped by opening breaker NB0103, but this action is not required for PFSSD.

Based on the above discussion, spurious operation of the Train A SI pump will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13EM01, E-1F9102, E-1F9302, M-12EM01, M-721-00096, WCRE-01

5.2.9 Containment Spray Pumps

Spurious start of the containment spray (CS) pumps may complicate PFSSD due to the possible depletion of inventory in the RWST. Therefore, a spurious start of the CS pumps should be avoided or mitigated. A control cable (11ENB01AB) associated with Train A CS pump PEN01A runs through area C-12 and could cause the spurious start of the pump. The cable damage could prevent stopping the pump from the control room.

If the Train A CS pump spuriously starts, normally closed valve ENHV0006 will remain closed, since a spurious containment spray actuation signal (CSAS) is not credible for a fire in area C-12. This is due to the fact that none of the circuits for containment pressure are run in fire area C-12. In addition, cables associated with valve ENHV0006 do not run in area C-12. Therefore, if the CS pump operates, inventory will not be lost from the RWST. If necessary, the pump can be stopped by opening breaker NB0102, but this action is not required for PFSSD.

Based on the above discussion, the Train A containment spray pump could spuriously start but actual containment spray will not occur since valve ENHV0006 will remain closed.

References: XX-E-013, E-15000, E-13EN01, E-13EN03, E-1F9102, E-1F9302, M-12EN01

5.2.10 Control Room Air Conditioning

Cables associated with Train A control room A/C unit SGK04A are run in this area. Damage to these cables could prevent operation of this unit. Cables associated with Train B control room A/C unit SGK04B are run in a separate area. Therefore, the Train B control room A/C unit is unaffected by a fire in this area.

References: XX-E-013, E-15000, E-13GK02B, E-13GK02C, E-1F9442, M-12GK01

5.2.11 Class 1E Electrical Equipment Air Conditioning

Cables associated with Train A Class 1E A/C unit SGK05A are run in this area. Damage to these cables could prevent operation of this unit. Cables associated with Train B Class 1E A/C unit SGK05B are run in a separate area. Therefore, the Train B Class 1E A/C unit is unaffected by a fire in this area.

References: XX-E-013, E-15000, E-13GK13, E-1F9444, M-12GK03

5.2.12 Standby Diesel Generation

Cables associated with the Train A diesel engine are run in this area. Damage to these cables could prevent operation of the Train A diesel engine and/or cause the Train A load shedder/sequencer to malfunction.

A fire in area C-12 could cause a loss of off-site power on the Train A bus. Therefore, Train A equipment could be completely de-energized if a fire occurs in this area. Train B off-site power bus and Train B diesel engine are unaffected by a fire in this area. Therefore, loss of the Train A diesel engine will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-12KJ01, E-13KJ01A, E-13NE12, E-13NF01, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, E-1F9423, M-12KJ01, M-12KJ02, M-12KJ03

5.2.13 Train A Class 1E 4.16 kV ESF Switchgear Bus NB01

Several cables associated with class 1E 4.16 kV switchgear bus NB01 are located in this area. Damage to these cables could prevent operation of Train A equipment powered by NB01. Cables associated with class 1E 4.16 kV switchgear bus NB02 are located in a different fire area. Therefore, Train B 4.16 kV switchgear is unaffected by a fire in area C-12.

References: XX-E-013, E-15000, E-13NB01, E-13NB02, E-13NB03, E-13NB10, E-13NB12, E-13NB13, E-13NE01, E-1F9423, E-1F9425, E-1F9426

5.2.14 Train A 480 VAC Load Centers

Cables associated with 480 VAC load centers NG01, NG03 and motor control center (MCC) NG05E are run in area C-12. Damage to these cables could de-energize the load centers and MCC, preventing operation of the associated Train A equipment.

Cables 11PKK10AA and 11PKK10AB are associated with the 125 VDC control circuit for 125 VDC control power to breaker NG0102, which supplies 480 VAC to battery charger PK21. Damage to these cables could disrupt power to PK21, which would deenergize the normal source of power to non-class 1E 125 VDC bus PK01.

Train B 480 VAC load centers NG02, NG04 and MCC NG06E are unaffected by a fire in this area and are available to supply power to redundant Train B equipment. In addition, power to non-class 1E 125 VDC bus PK02 is unaffected by a fire in area C-12. Therefore, a fire in area C-12 will not impact the ability to supply power to required Train B 480 VAC equipment.

References: XX-E-013, E-15000, E-11NG01, E-11PK01, E-13NG01, E-13NG10, E-13NG11, E-13PK10, E-1F9422C, E-1F9423, E-1F9424A, E-1F9424B, E-1F9424C, E-1F9424D, E-K3NG01, E-K3NG10, J-200-00176

5.2.15 Class 1E 120 VAC Electrical Distribution System

The Class 1E 120 VAC electrical distribution system provides power to vital instrumentation and control loads for shutdown and normal operation. Under normal conditions, the system is supplied by inverters connected to the 125 VDC NK battery system. Swing inverters allow the primary inverters to be taken out of service for maintenance or repair without disrupting power to the associated vital AC bus. In the event of a loss of power to the inverters, a backup source of power is automatically lined up. The backup power source originates from the 480 VAC electrical distribution system (NG).

Cable 11NNG01AA supplies 480 VAC power from NG0~~0~~1ACR3 to inverter NN11. Cable 11NNG01CA supplies 480 VAC power from NG01AGF3 to inverter NN13. Damage to these cables will disrupt the 480 VAC power source to inverters NN11 and NN13. The 480 VAC power supply to swing inverter NN15 is unaffected.

Cables 11NNK01JA and 11NNK01JB supply 125 VDC power from NK0103 to manual transfer switch NK79. Damage to these cables will disrupt the 125 VDC power supply from NK0103 to swing inverter NN15. The 125 VDC power supply from NK0303 to swing inverter NN15 is unaffected.

Cables 11NNY01EA and 11NNY01EB supply 120 VAC power from swing inverter NN15 to bus NN01 through a manual transfer switch in inverter NN11. Damage to these cables will disrupt the 120 VAC power supply from swing inverter NN15 to NN01. The 120 VAC power supply from inverter NN11 to bus NN01 is unaffected.

As stated in Section 5.2.14, a fire in area C-12 could cause a loss of Train A 480 VAC power. This would cause a loss of 480 VAC power to the Train A NK battery chargers (NK21, NK23 and NK25) which will cause a loss of normal power to the NK01 and NK03 busses. Batteries NK11 and NK13 are unaffected and can supply 125 VDC to busses NK01 and NK03 to provide power to inverters NN11 and NN13 for a limited time.

Train B vital 120 VAC distribution panels NN02 and NN04 are unaffected by a fire in area C-12. Therefore, in the event of a loss of Train A Class 1E 120 VAC electrical distribution system, the Train B Class 1E electrical distribution switchboards are available to supply redundant PFSSD loads.

Based on the above discussion, damage to cables and components associated with Train A vital 120 VAC distribution panels NN01 and NN03 will not adversely impact the ability to achieve and maintain safe shutdown in the event of a fire in area C-12.

References: XX-E-013, E-15000, E-11NK01, E-13NN01, E-1F9421

5.2.16 Non-Class 1E 120 VAC Electrical Distribution System

The PFSSD function of the non-Class 1E 120 VAC electrical distribution system is to supply 120 VAC power to Main Control Boards (MCBs) RL017/RL018 and RL021/RL022. The power is split at the MCB to supply specific PFSSD components.

The PFSSD components that depend on non class 1E 120 VAC power from RL017/RL018 are Residual Heat Removal (RHR) discharge valves EJHCV0606 (Train A) and EJHCV0607 (Train B). Non-class 1E switchboard panel PN07 supplies power from switch PN0736 to valve positioner EJHY0606. Valve positioner EJHY0606 controls the position of EJHCV0606 using hand controller EJHIC0606. Non-class 1E switchboard panel PN08 supplies power from switch PN0833 to valve positioner EJHY0607. Valve positioner EJHY0607 controls the position of EJHCV0607 using hand controller EJHIC0607.

The PFSSD components that depend on non class 1E 120 VAC power from RL021/RL022 are temperature recorders BBTR0423, BBTR0433 and BBTR0443. Non-class 1E switchboard

panel PN07 supplies power from switch PN0738 to temperature recorder BBTR0423. Non-class 1E switchboard panel PN08 supplies power from switch PN0835 to temperature recorders BBTR0433 and BBTR0443.

Cables 11PNG01AD and 11PNG01AE supply 480 VAC power from NG001BEF4 to 480/120V transformer XPN07A. Damage to either of these cables due to a fire in area C-12 will result in a loss of power to the transformer and loss of 120 VAC feed to PN07 from this power source. An alternate source of power to PN07 exists, and originates from PG019GFR3 (480 VAC). Cables associated with the alternate power feed to PN07, through transformer XPN07D, do not run in area C-12 and are unaffected by the fire. Therefore, the PFSSD loads supplied by PN07 are available if a fire occurs in area C-12.

Both the normal and alternate power sources for non-class 1E 120 VAC distribution switchboard PN08 are unaffected by a fire in this area. Therefore, the PFSSD loads supplied by PN08 are available if a fire occurs in area C-12.

Based on the above discussion, both non-class 1E electrical distribution switchboards PN07 and PN08 are available if a fire occurs in area C-12.

References: XX-E-013, E-15000, E-13PN01, E-13PN01A, E-13RL04, E-13RL06, E-1F9201, E-1F9205, E-1F9421

5.2.17 Auxiliary Relay Rack RP139

Auxiliary relay rack RP139 contains a number of PFSSD relays used for operation of Train A equipment. A fire in area C-12 could damage cables supplying 125 VDC and 120 VAC power to the various relays within RP139. Damage to the power cables could prevent operation of the associated equipment, or could cause the component to spuriously operate.

Cables associated with redundant Train B auxiliary relay panel RP140 do not run through area C-12. Therefore, PFSSD is assured using Train B components controlled by auxiliary relay panel RP140.

References: XX-E-013, E-15000, E-13BB39, E-13EG01A, E-13EG01B, E-13GK02C, E-13GK13, E-13RP09, E-1F9401A, E-1F9401B, E-1F9402A, E-1F9301, E-1F9442, E-1F9444, E-K3EF01

5.2.18 Letdown Isolation Valves

Valves BGLCV0459 and BGLCV0460 are isolation valves installed in series on the inlet side of the regenerative heat exchanger. PFSSD requires that either of these valves be closed.

Cables 15BGK10AA and 15BGK10AD are power/control cables for the BGLCV0459 solenoid valve (BGHY0459). Air supplied by an open (energized) solenoid valve will open valve BGLCV0459. A closed (de-energized) solenoid valve will cause loss of air pressure and closure of valve BGLCV0459.

Cables 15BGK10BA and 15BGK10BD are power/control cables for the BGLCV0460 solenoid valve (BGHY0460). Air supplied by an open (energized) solenoid valve will open valve BGLCV0460. A closed (de-energized) solenoid valve will cause loss of air pressure and closure of valve BGLCV0460.

Either BGLCV0459 or BGLCV0460 must be closed or letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C must be closed. The cables for BGLCV0459 or BGLCV0460 are routed in a common enclosure in cable trays. A hot short on the cables could cause the valves to open. A hot short on cables 15BGK10AA and 15BGK10BA prevents closing BGLCV0459 and BGLCV0460 from the control room. Other cables routed in the cable trays have the proper voltage for hot shorts which can bypass MCB hand switches for

BGLCV0459 and BGLCV0460. BGLCV0459 and BGLCV0460 constitute a high/low pressure interface. Therefore, multiple simultaneous hot shorts must be considered.

Letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C are listed as PFSSD components because of the interlock between these valves and BGLCV0459 and BGLCV0460. The interlock prevents closure of the letdown valves when any one or more orifice isolation valves are open. Cables associated with all three letdown orifice isolation valves are located in this fire area. Damage to these cables could prevent closure of the valves from the control room. Therefore, a fire in area C-12 will prevent closure of all three letdown orifice isolation valves (BGHV8149A, BGHV8149B, and BGHV8149C) as well as the two letdown isolation valves (BGLCV0459 and BGLCV0460).

Valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B, and BGHV8149C are air operated and fail in the closed position. The valves are located in containment. Instrument air to containment is controlled by valve KAFV0029, which is unaffected by a fire in area C-12. Hand switch KAHIS0029 can be used to close the valve from the control room and isolate instrument air to containment. Pressurizer level indication is available using BBLI0459A and BBLI0460A.

Based on the above discussion, letdown valves BGLCV0459 and BGLCV0460 and letdown orifice valves BGHV8149A, BGHV8149B, and BGHV8149C can be closed from the control room if a fire occurs in area C-12.

References: E-15000, XX-E-013, E-13BG10, E-13BG35, E-13KA02, E-1F9301, M-12BG01, M-12KA01

5.2.19 Steam Generator Blowdown to Blowdown Flash Tank Isolation Valves

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown.

Cables 15BMK06AB, 15BMK06BB, 15BMK06CB and 15BMK06DB are associated with the BM157 panel mounted handswitches for each of the BMHV valves. Damage to these cables could impact the ability to close the valves from BM157 in the Radwaste Control Room. However, the normal means of closing these valves using the RL024 mounted handswitches in the Main Control Room remains available. Therefore, a fire in area C-12 will not prevent the closure of valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004.

Panel RP211 is an auxiliary relay rack located in room 1101. Power to this panel is supplied by PK5129 through cable 15RPK09EA. Loss of power to the relay panel will result in loss of power to relay 3XBM46. The function of this relay is to close valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004 if a blowdown and sample process isolation signal is received. Under normal conditions the relay is de-energized, the auxiliary contacts are closed, and valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004 are open.

Relay 3XBM46 is associated with the BM157 control circuit. Failure of this relay or associated cable will not prevent closing the blowdown valves from the control room.

References: E-15000, XX-E-013, E-13BM04, E-13BM06A, E-13BM06B, E-13BM06C, E-13BM06D, E-1F9101, E-093-00028, M-12BM01

5.2.20 Boron Injection Downstream Test Line Isolation Valves

To prevent CCP flow diversion through the SIS test line when charging through the BIT, valves EMHV8843 and EMHV8882 need to be closed. If either or both of these valves cannot be closed, then closing or maintaining closed either valve EMHV8871 or EMHV8964 will accomplish the PFSSD objective.

Cable 15EMK05EA is a control cable for EMHV8882. A hot short in cable 15EMK05EA will energize the solenoid and open valve EMHV8882. The cable is run in raceways with cables carrying the proper voltage and polarity for a cable to cable hot short. The hot short would bypass the control room handswitch (EMHIS8882) on RL018 and control of this valve from the control room would be lost.

CCP flow diversion through the SIS test line is prevented by valves EMHV8871 or EMHV8964. Cables associated with EMHV8871 and EMHV8964 are run in a different fire area. Therefore, the flow path can be isolated using either EMHV8871 or EMHV8964.

References: E-15000, XX-E-013, E-13EM05A, E-1F9302, M-12EM01, M-12EM02

5.2.21 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling or spuriously open pressurizer spray is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs. Calculation WCNOC-CP-002 shows that if pressurizer spray spuriously actuates, the spray flow needs to be stopped within 50 minutes.

One control cable associated with reactor coolant pumps A and B is run in fire area C-12. Damage to these cables in the event of a fire could prevent operators from stopping the A and B RCPs from the control room. However, a fire in C-12 will not cause a loss of all seal cooling since RCP seal injection and thermal barrier cooling remain available. As discussed in Section 5.2.22, if pressurizer spray spuriously operates, operators can stop the spray by isolating air to the valve from the control room. Therefore, tripping the RCPs is not required to mitigate spurious pressurizer spray.

Based on the above discussion, the inability to trip RCPs A and B from the control room will have no adverse impact on PFSSD. If pressurizer spray spuriously actuates, the valves can be closed by isolating air to the valves from the control room. In addition, seal injection and thermal barrier cooling are unaffected by a fire in area C-12. Therefore, the RCPs do not have to be tripped in the event of a fire in area C-12.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1, WCNOC-CP-002, CR 25002

5.2.22 Normal Pressurizer Spray

The normal pressurizer spray valves are included in the PFSSD design because spurious operation of pressurizer sprays can cause a decrease in pressure which can lead to boiling in the core. The pressurizer spray valves are part of the pressurizer pressure control system.

The pressurizer normal spray valves (BBPCV0455B and BBPCV0455C) operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

Cable 15BBI19AA associated with pressurizer spray valve BBPCV0455B, and cable 15BBI19BA associated with pressurizer spray valve BBPCV0455C are run in this area. Damage to these cables could cause the spurious opening of the spray valves.

The pressurizer spray valves are electro/pneumatic operated and loss of air pressure will close the valves. The air supply comes from the compressed air system. Closing valve KAFV0029 using KAHIS0029 on RL024 will isolate compressed air to containment which will cause the pressurizer spray valves to close or prevent them from opening. Based on WCNOC-CP-002, spray flow needs to be stopped within 50 minutes. Since this is a control room action, this can be completed well within 50 minutes.

Based on the above discussion, the pressurizer spray valves could spuriously open if a fire occurs in this area. Pressurizer spray can be stopped by closing valve KAFV0029 from the main control room. Pressurizer pressure indication is available using BBPI0455A, BBPI0456, BBPI0457 and BBPI0458.

References: E-15000, XX-E-013, E-13BB19, E-13KA02, M-744-00028, WCNOC-CP-002, CR 25002, M-761A-00019 Sh, 2, DCP 13324

5.2.23 Boron Injection Tank (BIT) Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available.

Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path is the additional RCS charging flowpath. A fire in area C-12 relies on CCP B, since circuits and support systems for CCP A may be affected by the fire. Also, based on the discussion in Section 5.2.18, a fire in area C-12 has the potential to cause a momentary loss of inventory through the letdown flow path until the letdown isolation valves close automatically or are failed closed.

Train A BIT outlet valve EMHV8801A cable 11EMG02CF is run in this area. Cable 11EMG02CF is a fire resistive cable and is not susceptible to fire induced damage. The Train A BIT inlet valve EMHV8803A and the Train B BIT outlet and inlet valves EMHV8801B and EMHV8803B, respectively, do not have cables in area C-12. Therefore, the BIT inlet and outlet valves for both trains are unaffected by a fire in area C-12.

Based on the above discussion, the BIT flowpath is unaffected by a fire in area C-12.

References: E-15000, XX-E-013, E-1F9302, E-13EM02, E-13EM02A, E-13EM02B, M-12EM02C

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1.0 GENERAL AREA DESCRIPTION

Fire area C-13 is located on the 2016 elevation of the Control Building and includes the room listed in Table C-13-1.

Table C-13-1
Rooms Located in Fire Area C-13

ROOM #	DESCRIPTION
3415	Train B Access Control and Class 1E Elec Equip Room A/C Units

Fire area C-13 is protected with automatic fire detection throughout. There is no automatic suppression installed in this area. The area is separated from all adjacent areas by minimum 3-hour fire rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-13-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-13-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-13

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.

Table C-13-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-13

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
GK	Control Room and Class 1E Switchgear Room Coolers	S	Train B class 1E electrical equipment room A/C unit SGK05B may be affected. Train A class 1E electrical equipment room A/C unit SGK05A is unaffected.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.

Table C-13-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-13

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.

Table C-13-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-13

System	System Name	PFSSD Function*	Comments
SA	ESFAS	S	Status panel input for SGK05B could be affected. Status panel input for SGK05A is unaffected.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-13.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-13. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is unaffected by a fire in area C-13.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-13.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-13

PFSSD components (S. in E-15000) located in fire area C-13 are shown in Table C-13-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table C-13-3.

Table C-13-3
PFSSD Equipment Located in Fire Area C-13

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
3415	GK196A	Class 1E Elec Equip Room A/C Unit SGK05B Control Panel	5.1.1	
3415	GK196B	Class 1E Elec Equip Room A/C Unit SGK05B Power Panel	5.1.1	
3415	GK196C	Class 1E Elec Equip Room A/C Unit SGK05B Pwr/Ctrl Panel	5.1.1	
3415	SGK05B	Train B Class 1E Elec Equip Room A/C Unit	5.1.1	
3415	TB34118	SGK05B Terminal Box	5.1.1	

5.1.1 Class 1E Electrical Equipment Room Air Conditioning

Class 1E electrical equipment room air conditioning is required to satisfy the PFSSD support function of maintaining cooling within the Class 1E electrical equipment rooms. Fire area C-13 contains the Train B Class 1E electrical equipment room A/C unit SGK05B as well as a number of associated cables. A fire in this area could damage the unit and/or associated cables and prevent operation of the unit. Therefore, SGK05B is unavailable if a fire occurs in area C-13.

Cable 14SAZ20HA associated with SGK05B is run in fire area C-13. Damage to this cable could prevent operation of SGK05B. Cables associated with SGK05A are unaffected by a fire in area C-13.

Train A Class 1E electrical equipment room air conditioning unit SGK05A is located in a separate fire area and is unaffected by a fire in area C-13. Therefore, Class 1E electrical equipment room cooling is available to Train A components if a fire occurs in fire area C-13.

References: E-15000, XX-E-013, E-13GK13A, E-13GK13B, E-13SA20, E-1F9444, M-622.1A-00002

5.2 PFSSD CABLE EVALUATION

Table C-13-4 lists all the PFSSD cables (S. in E-15000) located in fire area C-13. The applicable evaluation section is also listed in Table C-13-4.

Table C-13-4
PFSSD Cables Located in Fire Area C-13

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GKG13BA	3415	SGK05B	P	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13BH	3415	SGK05B	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13BK	3415	SGK05B	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13BM	3415	SGK05B	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13BN	3415	SGK05B	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13BP	3415	SGK05B	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13BQ	3415	SGK05B	P	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13BR	3415	SGK05B	P	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13BS	3415	SGK05B	P	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13DA	3415	SGK05B	I	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13DB	3415	SGK05B	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13DC	3415	SGK05B	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13DD	3415	SGK05B	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13DE	3415	SGK05B	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13DF	3415	SGK05B	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13DG	3415	SGK05B	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13DH	3415	SGK05B	P	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13DJ	3415	SGK05B	P	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13DK	3415	SGK05B	P	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14GKG13DL	3415	SGK05B	P	5.1.1	Class 1E Elec. Equip. Room A/C Unit
14SAZ20HA	3418	SGK05B	C	5.1.1	Status Panel SA066B Input from SGK05B

FIRE AREA C-14

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1.0 GENERAL AREA DESCRIPTION

Fire area C-14 is located on the 2016 elevation of the Control Building and includes the room listed in Table C-14-1.

Table C-14-1
Rooms Located in Fire Area C-14

ROOM #	DESCRIPTION
3416	Train A Access Control and Class 1E Elec Equip Room A/C Units

Fire area C-14 is protected with automatic fire detection throughout. There is no automatic suppression installed in this area. The area is separated from all adjacent areas by minimum 3-hour fire rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-14-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-14-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-14

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.

Table C-14-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-14

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
GK	Control Room and Class 1E Switchgear Room Coolers	S	Train A class 1E electrical equipment room A/C unit SGK05A may be affected. Train B class 1E electrical equipment room A/C unit SGK05B is unaffected.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.

Table C-14-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-14			
System	**System Name**	**PFSSD Function***	**Comments**
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.

Table C-14-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-14			
System	**System Name**	**PFSSD Function***	**Comments**
SA	ESFAS	S	Status panel input for SGK05A could be affected. Status panel input for SGK05B is unaffected.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-14.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-14. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is unaffected by a fire in area C-14.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-14.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-14

PFSSD components (S. in E-15000) located in fire area C-14 are shown in Table C-14-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table C-14-3.

Table C-14-3 PFSSD Equipment Located in Fire Area C-14				
Room #	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
3416	GK195A	Class 1E Elec Equip Room A/C Unit SGK05A Control Panel	5.1.1	
3416	GK195B	Class 1E Elec Equip Room A/C Unit SGK05A Power Panel	5.1.1	
3416	GK195C	Class 1E Elec Equip Room A/C Unit SGK05A Pwr/Ctrl Panel	5.1.1	
3416	SGK05A	Train A Class 1E Elec Equip Room A/C Unit	5.1.1	
3416	TB34117	SGK05A Terminal Box	5.1.1	

5.1.1 Class 1E Electrical Equipment Air Conditioning

Class 1E electrical equipment room air conditioning is required to satisfy the PFSSD support function of maintaining cooling within the Class 1E electrical equipment rooms. Fire area C-14 contains the Train A Class 1E electrical equipment room A/C unit SGK05A as well as a number of associated cables. A fire in this area could damage the unit and/or associated cables and prevent operation of the unit. Therefore, SGK05A is unavailable if a fire occurs in area C-14.

Cable 11SAZ19KA associated with SGK05A is run in fire area C-14. Damage to this cable could prevent operation of SGK05A. Cables associated with SGK05B are unaffected by a fire in area C-14.

Train B Class 1E electrical equipment room air conditioning unit SGK05B is located in a separate fire area and is unaffected by a fire in area C-14. Therefore, Class 1E electrical equipment room cooling is available to Train B components if a fire occurs in fire area C-14.

References: E-15000, XX-E-013, E-13GK13, E-13GK13B, E-13SA19, E-1F9444, M-622.1A-00002

5.2 PFSSD CABLE EVALUATION

Table C-14-4 lists all the PFSSD cables (S. in E-15000) located in fire area C-14. The applicable evaluation section is also listed in Table C-14-4.

Table C-14-4
PFSSD Cables Located in Fire Area C-14

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GKG13AA	3416	SGK05A	P	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13AB	3416	SGK05A	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13AH	3416	SGK05A	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13AJ	3416	SGK05A	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13AK	3416	SGK05A	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13AL	3416	SGK05A	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13AM	3416	SGK05A	P	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13CA	3416	SGK05A	I	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13CB	3416	SGK05A	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13CC	3416	SGK05A	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13CD	3416	SGK05A	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13CE	3416	SGK05A	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13CF	3416	SGK05A	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13CG	3416	SGK05A	C	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13CH	3416	SGK05A	P	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13CJ	3416	SGK05A	P	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13CK	3416	SGK05A	P	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11GKG13CL	3416	SGK05A	P	5.1.1	Class 1E Elec. Equip. Room A/C Unit
11SAZ19KA	3416	SGK05A	C	5.1.1	Status Panel SA066A Input from SGK05A

FIRE AREA C-15

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-15 is located on the 2016 elevation of the Control Building and includes the rooms listed in Table C-15-1.

Table C-15-1
Rooms Located in Fire Area C-15

ROOM #	DESCRIPTION
3403	Non-Vital Swgr & Xfmr Room No. 1
3404	Switchboard Room No. 4
3405	Battery Room No. 4
3410	Switchboard Room No. 2
3411	Battery Room No. 2

Fire area C-15 is protected with an automatic Halon fire suppression system. In addition, automatic fire detection is installed throughout. The fire area is separated from adjacent fire areas by minimum 3-hour fire resistant construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-15-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-15-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-15

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Power to steam generators B and D ARVs ABPV0002 and ABPV0004 could be lost, preventing control of the ARVs from the control room and failing the ARVs closed. Steam generators A and C ARVs are unaffected. As stated in the AL system comments, only the Train A MDAFP is available to supply steam generator B and C. Per Calculation WCNOC-CP-002, hot standby can be maintained using a single steam generator. Main steam to TDAFP valves ABHV0005 and ABHV0006 could lose power and fail open, which is the desired PFSSD position. See AL System discussion for additional information on auxiliary feedwater. Power to main steam isolation bypass valves auxiliary relay 94XAB6 could be lost, which will fail the bypass valves closed which is the desired PFSSD position. Train B MSFIS cabinet SA075B could lose power, causing the MSIVs to fail closed, which is the desired PFSSD position.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
AE	Main Feedwater	H, P	Train B MSFIS cabinet SA075B could lose power, causing the MFIVs to fail closed, which is the desired PFSSD position.
AL	Aux. Feedwater System	H, P	The turbine driven auxiliary feedwater pump could be affected due to loss of 125 VDC power to ABHV0005, ABHV0006, FCFV0313 and FCHV0312. The Train B motor driven auxiliary feedwater pump (MDAFP) may not be available due to loss of control power to NB02. The Train A MDAFP is unaffected. ESFAS LSP signals from ALPT0038 and ALPT0039 could be affected, preventing swapover to ESW on low suction pressure from the condensate storage tank. Pressure transmitter ALPT0037 is unaffected. Operators can manually swap to ESW if necessary.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
BB	Reactor Coolant System	R, M, H, P, S	Cold leg temperature indication on all four RCS loops could be unavailable. Hot leg temperature indication on RCS loops 3 and 4 could be unavailable. Hot leg temperature indication on RCS loops 1 and 2 is available. This is acceptable as discussed in Section 5.2.2. Pressurizer PORV BBPCV0456A could lose 125 VDC power and fail closed, which is the desired PFSSD position. Reactor head vent valves BBHV8001B and BBHV8002B could lose power, failing the valves closed which is the desired PFSSD position.

Table C-15-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-15			
System	**System Name**	**PFSSD Function***	**Comments**
BG	Chemical and Volume Control System	R, M, S	The Train B CCP may not be available due to loss of control power to NB02. The Train A CCP is available. Excess letdown valves BGHV8153B and BGHV8154B could lose power, causing the valves to fail closed which is the desired PFSSD position. RCP seal injection total flow indicator BGFI0215B may be affected due to loss of 120 VAC power to SB041. Flow indicator BGFI0215A is unaffected.
BM	Steam Generator Blowdown System	R, M, H	Steam generator blowdown valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 could lose power, failing the valves closed which is the desired PFSSD position.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
EF	Essential Service Water System	H, S	The Train B ESW pump could be affected. The Train A ESW pump is unaffected.
EG	Component Cooling Water System	S	The Train B component cooling water pumps (DPEG01B and DPEG01D) may not be available due to loss of control power to NB02. Power to Train B temperature control valve EGTV0030 could be lost, failing the valve closed. This would prevent temperature control on the Train B CCW system but will not prevent the system from performing it's PFSSD functions. Train A CCW system is unaffected. CCW to RCP flow indicator EGFI0129 may be affected due to loss of 120 VAC power to RP053B. Flow indicator EGFI0128 is unaffected.
EJ	Residual Heat Removal System	M, H, P	The Train B RHR system may not be available due to loss of control power to NB02. The Train A RHR system is available. Train B RHR discharge valve EJHCV0607 could be affected. Train A RHR discharge valve EJHCV0606 is unaffected.
EM	High Pressure Coolant Injection	R, M	Valves EMHV8843 and EMHV8871 could lose power, failing the valves closed which is the desired PFSSD position.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
EP	Safety Injection Accumulators	H	Position indication for accumulator injection valves EPHV8808B and EPHV8808D could be affected due to loss of 125 VDC power to the hand switch indicating lights. This will not affect the ability to close the valves from the control room using the respective hand switches.

Table C-15-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-15

System	System Name	PFSSD Function*	Comments
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
FC	Auxiliary Turbines	R, H, P	Control power to FCHV0312 could be lost, preventing operation of the turbine driven auxiliary feedwater pump. TDAFP steam trap valve FCFY0310 could lose power, failing the valve closed which is the desired PFSSD position. Valve FCFV0105 may be affected. The MSIVs can be closed using all-close hand switches ABHS0079 or ABHS0080.
GD	ESW Pump House HVAC	S	Train B ESW pump house temperature element GDTE0011, temperature switch GDTSL0011 and damper actuator GDTZ0011A could be affected. Train A ESW pump house HVAC is unaffected.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The Train B control room cooler SGK04B supply and return dampers GKHZ0040A and GKHZ0040B are affected. Train A control room cooler SGK04A supply and return dampers GKHZ0029B and GKHZ0029A are unaffected. The Train B Class 1E electrical equipment room cooler SGK05B is affected. The Train A Class 1E electrical equipment room cooler SGK05A may shut down due to a spurious fire isolation signal. The fire isolation signal can be bypassed from the main control room using GKHS0101 on panel RP068 and SGK05A can be started.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
GM	Emergency Diesel Generator Room HVAC	S	Train B diesel generator room exhaust damper GMHZ0019 could lose power, failing the damper open which is the desired PFSSD position.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
JE	Diesel Fuel Oil	S	Train B emergency diesel generator day tank low level switch JELSL0021C and day tank level transmitter JELT0021 could be affected. Train A emergency diesel generator day tank components are unaffected.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
KC	Fire Protection	S	A fire in this area could cause a spurious fire isolation signal causing SGK05A to shut down. See GK System discussion for additional information.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.

Table C-15-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-15

System	System Name	PFSSD Function*	Comments
KJ	Standby Diesel Engine	S	Train B diesel engine control panel KJ122 could lose power, preventing operation of the Train B diesel generator. Train B off-site power and the Train A diesel generator are unaffected by a fire in this area.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
NB	4.16 kV System	S	Train B 125 VDC control power to NB02 could be lost. Train A 125 VDC control power to NB01 is unaffected.
NE	Standby Diesel Generator	S	Train B diesel generator may not be available due to loss of 125 VDC control power to NE106. Offsite power to NB02 is unaffected and the Train A diesel generator is unaffected.
NF	Load Shed and Emergency Load Sequencing	S	Train B load shed/emergency load sequencing may be affected due to loss of 125 VDC control power to NF039C. Train A load shed/emergency load sequencing is unaffected.
NG	480V Load Centers and MCCs	S	Train B 125 VDC control power to NG02 and NG04 could be lost. Train A 125 VDC control power to NG01 and NG03 is unaffected.
NK	125VDC	S	Train B Class 1E 125 VDC power could be affected. Train A Class 1E 125 VDC power is unaffected.
NN	120VAC	S	Train B Class 1E 120 VAC power could be affected. Train A Class 1E 120 VAC power is unaffected.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
PN	120VAC	S	Non-class 1E 120 VAC switchboard panel PN08 is affected. Non-class 1E 120 VAC switchboard panel PN07 is unaffected.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.

Table C-15-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-15

System	System Name	PFSSD Function*	Comments
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
RL	Control Room MCB	S	Train B Class 1E 125 VDC power to the following MCB panels could be affected: RL001/RL002, RL005/RL006, RL017/RL018, RL019/RL020, RL021/RL022 and RL023/RL024. This will not affect PFSSD as discussed in Section 5.1.2.
RP	Miscellaneous Control Panels	R, M, H, P, S	Loss of 125 VDC power to control room lockout relay racks RP334 and RP335 could occur. A fire in C-15 does not require evacuation and isolation of the control room. Therefore, loss of DC power to these relay racks will not impact PFSSD.
SA	ESFAS	S	Train B MSFIS cabinet SA075B could lose power, causing the MSIVs and MFIVs to fail closed, which is the desired PFSSD position.
SB	Reactor Protection System	R, S	Train B reactor trip switchgear cabinet SB102B could lose power. Train A reactor trip switchgear cabinet SB102A is unaffected. 125 VDC power to SB032D could be lost, preventing operation of the Train B reactor protection system. The Train A reactor protection system remains available. 120 VAC power to SB032D, SB041 and SB042 could be lost. Reactor protection system panels SB037 and SB038 are unaffected.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
SE	Ex-Core Neutron Monitoring	R, P	Source range monitors SENI0032B and SENY0061A/B could lose power. Source range monitors SENI0031B and SENI0060A/B are unaffected.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-15.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in fire area C-15. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Class 1E Electrical Equipment Room Cooler SGK05A

If a fire occurs in area C-15, SGK05A may not respond to an automatic start signal or may shut down due to a fire isolation signal. If this occurs, start SGK05A by placing GKHS0101 in bypass and start the unit normally. GKHS0101 is located on panel RP068 in the main control room.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post Fire Safe Shutdown is assured if a fire occurs in fire area C-15.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-15.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-15

PFSSD components (S. in E-15000) located in fire area C-15 are shown in Table C-15-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table C-15-3.

Table C-15-3 PFSSD Equipment Located in Fire Area C-15				
Room #	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
3403	PN08	120 VAC Non-Class 1E Distribution Switchboard	5.1.1	
3403	PN0806	Non-Class 1E 120 VAC Inverter PN10	5.1.1 5.2.3	
3403	PN0833	120 VAC to ESF Control Panel (RL017/RL018)	5.1.1	
3403	PN0835	120 VAC to Reactor Auxiliary Control Pnl (RL021/RL022)	5.1.1 5.2.2	
3403	PN08A	Voltage Regulator Panel - 22.5KVA	5.1.1	
3403	PN08B	Auto Transfer Switch	5.1.1	
3403	PN08C	PN System Transformer Regulator	5.1.1	
3403	TB34103	TB associated with 120 VAC Bus PN08	5.1.1	
3403	TB34104	TB associated with 120 VAC Bus PN08	5.1.1	
3403	XPN08A	Bus PN08 Primary Feed Transformer	5.1.1	
3403	XPN08D	Bus PN08 Alternate Feed Transformer	5.1.1	
3404	NK04	Train B Class 1E 125 VDC Bus	5.1.2	
3404	NK0400	125 VDC Class 1E Incoming Line From NK14 Batteries	5.1.2	
3404	NK0401	125 VDC Class 1E Line From/To Battery NK14	5.1.2	
3404	NK0402	125 VDC Class 1E From Transfer Switch NK74	5.1.2	
3404	NK0403	Class 1E 125 VDC to Transfer Switch NK80	5.1.2	
3404	NK0404	125 VDC Class 1E Control Distr Swbd (NK44)	5.1.2	
3404	NK0405	125 VDC Class 1E Control Distr Swbd (NK54)	5.1.2	
3404	NK0411	7.5 KVA Inverter (NN14)	5.1.2	
3404	NK24	125 VDC Class 1E Battery Charger	5.1.2	
3404	NK44	125 VDC Class 1E Distribution Switchboard	5.1.2	
3404	NK4400	125 VDC Class 1E Distr Swbd Incoming Feeder	5.1.2	

Table C-15-3
PFSSD Equipment Located in Fire Area C-15

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
3404	NK4401	NB02 Breaker Control Power	5.1.2	
3404	NK4402	NG04 Breaker Control Power	5.1.2	
3404	NK4407	RC & Support Sys Control Panel (RL001/RL002)	5.1.2	
3404	NK4409	Turbine Gen & Fdwtr Ctrl Pnl (RL005/RL006)	5.1.2	
3404	NK4411	Turbine Gen & Fdwtr Ctrl Pnl (RL023/RL024)	5.1.2	
3404	NK4412	ESF Control Panel (RL017/RL018)	5.1.2	
3404	NK4413	ESF Control Panel (RL019/RL020)	5.1.2	
3404	NK4414	Reactor Auxiliary Control Pnl (RL021/RL022)	5.1.2	
3404	NK4415	Auxiliary Relay Rack (RP140)	5.1.2	
3404	NK4416	Solid State Protection Sys Cabinet (SB032D)	5.1.2	
3404	NK4417	Auxiliary Relay Rack (RP210)	5.1.2	
3404	NK4419	Auxiliary Relay Rack (RP335)	5.1.2	
3404	NK4421	Pressurizer PORV (BBPCV456A)	5.1.2	
3404	NK54	125 VDC Class 1E Distribution Switchboard	5.1.2	
3404	NK5400	125 VDC Class 1E Distr Swbd Incoming Feeder	5.1.2	
3404	NK5401	NG02 Breaker Control Power	5.1.2	
3404	NK5409	ESFAS Cabinet (SA036B)	5.1.2	
3404	NK5410	Reactor Trip Switchgear Cabinet (SB102B)	5.1.2	
3404	NK5412	Load Shed/Sequencer Panel Ch 1 & 4 (NF039C)	5.1.2	
3404	NK5414	Diesel Generator Control Panel (KJ122)	5.1.2	
3404	NK5423	MSFIS Cabinet Group 4 (SA075B)	5.1.2	
3404	NK5424	Diesel Generator Pnl NE106 & Field Flashing	5.1.2	
3404	NK74	Battery Chgr NK24/NK26 Transfer Switch (NK04)	5.1.2	
3404	NKHS0014	Battery Chgr NK24/NK26 Transfer Switch (NK04) HS	5.1.2	

Table C-15-3
PFSSD Equipment Located in Fire Area C-15

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
3404	NKHS0264	Bus NK02/NK04 Transfer Switch (NK26) Handswitch	5.1.2	
3404	NN04	120VAC Class 1E Distribution Switchboard	5.1.3	
3404	NN0401	120VAC Class 1E Incoming From Inverter NN14	5.1.3	
3404	NN0403	ESFAS Panel (SA036B)	5.1.3	
3404	NN0404	BOP Instrumentation Rack (RP147B)	5.1.3	
3404	NN0405	LSELS Panel (NF039B)	5.1.3	
3404	NN0406	Neutron Flux Monitor Signal Amp (SENY61A)	5.1.3	
3404	NN0407	LSELS Panel (NF039A)	5.1.3	
3404	NN0408	NFMS Processor (SENY61B)	5.1.3	
3404	NN0409	SSPS Train A Input (SB029A)	5.1.3	
3404	NN0410	SSPS Train B Input (SB032A)	5.1.3	
3404	NN0412	SSPS Train B #2 Output (SB032D)	5.1.3	
3404	NN0414	Process Protection Set 4 Panel (SB041)	5.1.3	
3404	NN0416	BOP Instrumentation Rack (RP053BC)	5.1.3	
3404	NN0418	BOP Instrumentation Rack (RP053BC)	5.1.3	
3404	NN0420	Fire Isolation Panel (SB148B)	5.1.3	
3404	NN0422	Train B Control Room A/C Unit Inlet & Discharge Dampers (GKHZ0040A & GKHZ0040B)	5.1.3	
3404	NN14	7.5 KVA Inverter	5.1.3	
3404	TB34120	Terminal Box associated with Inverter NN14	5.1.3	
3405	NK14 (NORTH)	Train B 125 VDC Class 1E Battery Set	5.1.2	
3405	NK14 (SOUTH)	Train B 125 VDC Class 1E Battery Set	5.1.2	
3410	NK02	Train B Class 1E 125 VDC Bus	5.1.2	
3410	NK0200	125 VDC Class 1E Incoming Line From NK12 Batteries	5.1.2	

Table C-15-3
PFSSD Equipment Located in Fire Area C-15

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
3410	NK0201	125VDC Class 1E Line From/To Battery NK12	5.1.2	
3410	NK0202	125VDC Class 1E From Transfer Switch NK72	5.1.2	
3410	NK0203	Class 1E 125 VDC to Transfer Switch NK80	5.1.2	
3410	NK0204	125VDC Class 1E Instr Distr Swbd (NK42)	5.1.2	
3410	NK0211	7.5 KVA Inverter (NN12)	5.1.2	
3410	NK22	125VDC Class 1E Battery Charger	5.1.2	
3410	NK42	125VDC Class 1E Distribution Switchboard	5.1.2	
3410	NK4200	125VDC Class 1E Distr Swbd Incoming Feeder	5.1.2	
3410	NK4201	Auxiliary Relay Rack (RP334)	5.1.2	
3410	NK4205	ESFAS Cabinet (SA036C)	5.1.2	
3410	NK4206	Turbine Gen & Fdwtr Ctrl Pnl (RL005/Rl006)	5.1.2	
3410	NK4208	Auxiliary Relay Rack (RP266)	5.1.2	
3410	NK72	Battery Chgr NK22/NK26 Xfer Switch (NK02)	5.1.2	
3410	NKHS12	Battery Chgr NK22/NK26 Xfer Switch (NK02)	5.1.2	
3410	NKHS262	Bus NK02/NK04 Xfer Switch (NK26)	5.1.2	
3410	NN02	120VAC Class 1E Distribution Switchboard	5.1.3	
3410	NN0201	120VAC Class 1E Incoming From Inverter NN12	5.1.3	
3410	NN0203	BOP Instrumentation Rack (RP147A)	5.1.3	
3410	NN0204	LSELS Panel (NF039B)	5.1.3	
3410	NN0205	ESFAS Panel (SA036C)	5.1.3	
3410	NN0206	LSELS Panel (NF039A)	5.1.3	
3410	NN0208	BOP Instrumentation Rack (RP053DA)	5.1.3	
3410	NN0209	SSPS Train B Input (SB032A)	5.1.3	
3410	NN0210	SSPS Train A Input (SB029A)	5.1.3	

Table C-15-3
PFSSD Equipment Located in Fire Area C-15

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
3410	NN0211	Nuc Instr NIS 2 Panel (SE054B)	5.1.3	
3410	NN0212	Process Protection Set 2 Panel (SB042)	5.1.3 5.2.2	
3410	NN0217	Fire Isolation Panel (SB148B)	5.1.3	
3410	NN12	7.5 KVA Inverter	5.1.3	
3411	NK12 (NORTH)	Train B 125 VDC Class 1E Battery Set	5.1.2	
3411	NK12 (SOUTH)	Train B 125 VDC Class 1E Battery Set	5.1.2	

5.1.1 Non-Class 1E 120 VAC Electrical Distribution System

The PFSSD function of the non-Class 1E 120 VAC electrical distribution system is to supply 120 VAC power to Main Control Boards (MCBs) RL017/RL018 and RL021/RL022. The power is split at the MCB to supply specific PFSSD components. The other PFSSD function of the non-Class 1E 120 VAC electrical distribution system is to supply power to steam generator feedwater pump controller cabinets FC169A/C and FC170A/C. See Section 5.2.3 for a detailed discussion about the steam generator feedwater pumps.

The PFSSD components that depend on 120 VAC power from RL017/RL018 are Residual Heat Removal (RHR) discharge valves EJHCV0606 (Train A) and EJHCV0607 (Train B). Non-class 1E 120 VAC switchboard panel PN07 supplies power from switch PN0736 to solenoid valve EJHY0606. Solenoid valve EJHY0606 controls the position of EJHCV0606 using hand controller EJHIC0606. Non-class 1E 120 VAC switchboard panel PN08 supplies power from switch PN0833 to solenoid valve EJHY0607. Solenoid valve EJHY0607 controls the position of EJHCV0607 using hand controller EJHIC0607.

The PFSSD components that depend on 120 VAC power from RL021/RL022 are temperature recorders BBTR0423, BBTR0433 and BBTR0443. Non-class 1E switchboard panel PN07 supplies power from switch PN0738 to temperature recorder BBTR0423. Non-class 1E switchboard panel PN08 supplies power from switch PN0835 to temperature recorders BBTR0433 and BBTR0443.

Non-class 1E 120 VAC switchboard panel PN08 and several associated cables and components (PN08A, PN08B, PN08C, TB34103, TB34104, XPN08A, XPN08D) are located in fire area C-15. Therefore, solenoid valve EJHY0607 and temperature recorders BBTR0433 and BBTR0443 could lose power if a fire occurs in this area. A loss of power to EJHY0607 will fail valve EJHCV0607 open and will prevent control of EJHCV0607 from the control room. Loss of power to temperature recorders BBTR0433 and BBTR0443 will result in a loss of RCS loops 3 and 4 temperature indication.

Non-class 1E 120 VAC power to panel PN07 is unaffected by a fire in this area. Train A RHR valve EJHCV0606 is unaffected by a fire in area C-15, so Train A RHR can be used for shutdown cooling. For a detailed discussion on PFSSD impact on loss of RCS temperature indication, see Section 5.2.2.

Based on the above discussion, a loss of non-class 1E 120 VAC distribution switchboard PN08 will not adversely impact safe shutdown.

References: XX-E-013, E-15000, E-13PN01, E-13PN01A, E-13RL01, E-13RL04, E-13RL06, E-1F9201, E-1F9205, E-1F9421, E-1F9424E

5.1.2 Class 1E 125 VDC Electrical Distribution System

The PFSSD function of the Class 1E 125 VDC electrical distribution system is to provide a reliable source of DC power to the Class 1E DC loads for control and switching of the Class 1E systems. The DC system is separated into four subsystems, two per load group. Subsystems 1 and 3 (Train A) belong to one load group while subsystems 2 and 4 (Train B) belong to the second load group. The safety actions provided by one load group are independent of the safety actions provided by its redundant counterpart.

The battery chargers for each DC subsystem are energized by Class 1E 480 VAC power, which provides the normal source of power to each bus. Each load group is provided with a swing battery charger that is energized by Class 1E 480 VAC power as well as an alternate source of power from non-Class 1E 480 VAC power. The non-Class 1E 480 VAC power to the swing battery chargers is not modeled in the PFSSD analysis.

A fire in area C-15 could damage multiple cables and components associated with Train B Class 1E 125 VDC electrical distribution system. A number of components and cables that are required to energize Train B Class 1E 125 VDC electrical distribution buses NK02 and NK04 are located in this area. The following table identifies the PFSSD components that will be affected by a loss of Train B Class 1E 125 VDC electrical distribution system as well as the potential impact on PFSSD if power is lost.

Potential Impact on Loss of Train B Class 1E 125 VDC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NKHS0012	125 VDC Bus NK02	This is a transfer switch used to transfer the NK02 power source from battery charger NK22 to swing battery charger NK26. Damage to this switch could prevent battery charger NK22 from energizing NK02. The impact on PFSSD upon loss of this component is discussed in the individual switch discussions below.
NKHS0014	125 VDC Bus NK04	This is a transfer switch used to transfer the NK04 power source from battery charger NK24 to swing battery charger NK26. Damage to this switch could prevent battery charger NK24 from energizing NK04. The impact on PFSSD upon loss of this component is discussed in the individual switch discussions below.
NKHS0262 NKHS0264	125 VDC Buses NK02 and NK04	These are transfer switches used to transfer the swing battery charger to either NK02 or NK04. Damage to this component by itself will not cause a loss of power on either NK02 or NK04 since battery chargers NK22 and NK24 would be available.
NK72	Battery Charger NK22	Damage to this switch could prevent battery charger NK22 from energizing NK02. The impact on PFSSD upon loss of this component is discussed in the individual switch discussions below.
NK74	Battery Charger NK24	Damage to this switch could prevent battery charger NK24 from energizing NK04. The impact on PFSSD upon loss of this component is discussed in the individual switch discussions below.
N/A	NK0200	This is the incoming line to NK02 from battery set NK12. The impact on PFSSD upon loss of this component is discussed in the individual switch discussions below.

Potential Impact on Loss of Train B Class 1E 125 VDC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NK0201	125 VDC Bus NK02	Damage to this component will prevent battery set NK12 from energizing the NK02 bus. Battery chargers NK22 and NK26 could also be affected by a fire in this area, disabling all power to NK02. The impact on PFSSD is discussed in the individual switch discussions below.
NK0202	125 VDC Bus NK02	This switch controls the main power feed to NK02 from battery chargers NK22 and NK26. Battery set NK12 could also be affected by a fire in this area, disabling all power to NK02. The impact on PFSSD is discussed in the individual switch discussions below.
NK0203	Swing Inverter NN16	This switch controls one of two 125 VDC power feeds to swing inverter NN16 through transfer switch NK80. Loss of swing inverter NN16 will not adversely impact PFSSD as discussed in Section 5.1.3.
NK0204	NK42 NK4200	This is on the incoming line to 125 VDC distribution switchboard NK42. Damage to this component will de-energize NK42. The PFSSD switches and components that are affected are discussed below.
NK4201	Auxiliary Relay Rack RP334	The only relays in RP334 that are required for PFSSD are 86XRP1, 86XRP2 and 86XRP3. These are lockout relays used to isolate the control room if a fire occurs in the control room. Loss of DC power to the relays will prevent isolating the control room but will not cause a spurious control room isolation signal. Control room isolation is not required if a fire occurs in area C-15. Therefore, loss of DC power will not impact PFSSD.
NK4205	ESFAS Cabinet SA036C	SA036C is the Channel II logic and termination cabinet. Panel SA036C controls automatic safety features associated with auxiliary feedwater. Loss of DC power will not prevent manual operation of auxiliary feedwater. Therefore, loss of DC power will not impact PFSSD.
NK4206	Main Control Board Panels RL005/RL006	The PFSSD components on RL005/RL006 supplied by NK4206 are ABHV0005 and ABHV0006. Loss of power will fail the valves open, which is desired for operation of the turbine driven auxiliary feedwater pump (TDAFP). Therefore, loss of DC power will not impact PFSSD.

Potential Impact on Loss of Train B Class 1E 125 VDC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NK4208	Auxiliary Relay Rack RP266	There are no PFSSD relays in RP266. However, power is supplied to the control circuit for PFSSD components FCHV0312 and FCFV0313 through RP266. Valve FCHV0312 is the trip and throttle valve for the TDAFP. Valve FCFV0313 is the speed governing valve for the TDAFP. Loss of power could prevent operation of the TDAFP but the Train A MDAFP is unaffected by a fire in this area.
NK0211	Inverter NN12	See Section 5.1.3 for PFSSD impact on loss of Class 1E 120 VAC electrical distribution.
N/A	NK0400	This is the incoming line to NK04 from battery set NK14. The impact on PFSSD upon loss of this component is discussed in the individual switch discussions below.
NK0401	125 VDC Bus NK04	Damage to this component will prevent battery set NK14 from energizing the NK04 bus. Battery chargers NK24 and NK26 could also be affected by a fire in this area, disabling all power to NK04. The impact on PFSSD is discussed in the individual switch discussions below.
NK0402	125 VDC Bus NK04	This switch controls the main power feed to NK04 from battery chargers NK24 and NK26. Battery set NK14 could also be affected by a fire in this area, disabling all power to NK04. The impact on PFSSD is discussed in the individual switch discussions below.
NK0403	Swing Inverter NN16	This switch controls one of two 125 VDC power feeds to swing inverter NN16 through transfer switch NK80. Loss of swing inverter NN16 will not adversely impact PFSSD as discussed in Section 5.1.3.
NK0404	NK44 NK4400	This is on the incoming line to 125 VDC distribution switchboard NK44. Damage to this component will de-energize NK44. The PFSSD switches and components that are affected are discussed below.
NK4401	NB02 Breaker Control Power	Loss of control power for NB02 breakers will prevent operation of the associated equipment from the control room. Redundant Train A components fed from NB01 are available. Therefore, loss of DC power will not impact PFSSD.
NK4402	Load Center NG04 Breaker Control	Loss of control power for NG04 breakers will prevent operation of the associated equipment from the control room. Redundant Train A components fed from NG01 and NG03 are available. Therefore, loss of DC power will not impact PFSSD.

Potential Impact on Loss of Train B Class 1E 125 VDC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NK4407	RC and Support System Control Panel RL001/RL002	The PFSSD components on RL001/RL002 supplied by NK4407 are solenoid valves BGHV8153B and BGHV8154B on the excess letdown line. Loss of DC power will fail the valves closed which is the desired PFSSD position. Therefore, loss of DC power will not impact PFSSD.
NK4409	Turbine Generator and Feedwater Control Panel RL005/RL006	The PFSSD component on RL005/RL006 supplied by NK4409 is solenoid valve FCFY0310 which is the TDAFP steam trap drain valve. Loss of DC power will fail the valve closed which is the desired PFSSD position. Therefore, loss of DC power will not impact PFSSD.
NK4411	Turbine Generator and Feedwater Control Panel RL023/RL024	The PFSSD components on RL023/RL024 supplied by NK4411 are solenoid valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 which are steam generator blowdown valves. Loss of DC power will fail the valves closed which is the desired PFSSD position. Therefore, loss of DC power will not impact PFSSD.
NK4412	ESF Control Panel RL017/RL018	The PFSSD components on RL017/RL018 supplied by NK4412 are EMHV8843, EMHV8871, EPHIS8808B and EPHIS8808D. Valves EMHV8843 and EMHV8871 are solenoid valves on boron injection and SI test lines. Loss of DC power will fail the valves closed which is the desired PFSSD position. Hand switches EPHIS8808B and EPHIS8808D are associated with accumulator injection isolation valves EPHV8808B and EPHV8808D, respectively. Loss of 125 VDC power to the switches will affect position indication but will not affect operation of the valves. Therefore, loss of DC power will not impact PFSSD.
NK4413	ESF Control Panel RL019/RL020	The PFSSD components on RL019/RL020 supplied by NK4413 are solenoid valve EGTV0030 and damper GMHZ0019. Loss of DC power to EGTV0030 will fail the valve closed and prevent temperature control on the Train B CCW heat exchanger. Loss of temperature control will not affect operation of the Train B CCW system for PFSSD. Damper GMHZ0019 is the Train B diesel generator room exhaust damper. Loss of DC power will fail the damper open which is the desired PFSSD position. Therefore, loss of DC power will not impact PFSSD.

Potential Impact on Loss of Train B Class 1E 125 VDC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NK4414	Reactor Auxiliary Control Panel RL021/RL022	The PFSSD components on RL021/RL022 supplied by NK4414 are solenoid valves BBHV8001B and BBHV8002B which are reactor head vent valves. Loss of DC power will fail the valves closed which is the desired PFSSD position. Therefore, loss of DC power will not impact PFSSD.
NK4415	Auxiliary Relay Rack RP140	The PFSSD relays located in RP140 that are powered by NK4415 are 1XEF32, 1XEF34 and 1XEF36. These relays are associated with the Train B ESW pump. Loss of DC power could prevent operation of the Train B ESW pump motor but the Train A ESW pump is unaffected by the fire. Therefore, loss of DC power will not impact PFSSD.
NK4416	Solid State Protection Cabinet SB032D	Loss of DC power to SB032D will prevent operation of the Train B SSPS. Redundant Train A SSPS is available using SB029A through SB029E. Therefore, loss of DC power will not impact PFSSD.
NK4417	Auxiliary Relay Rack RP210	The only PFSSD relay in RP210 supplied by NK4417 is 94XAB6, which is the MSIV bypass valves auxiliary relay. The MSIV bypass valves fail closed on loss of power to the relay which is the desired PFSSD position. Therefore, loss of DC power will not impact PFSSD.
NK4419	Auxiliary Relay Rack RP335	The only relays in RP335 that are required for PFSSD are 86XRP5, 86XRP6 and 86XRP7. These are lockout relays used to isolate the control room if a fire occurs in the control room. Loss of DC power to the relays will prevent isolating the control room but will not cause a spurious control room isolation signal. Control room isolation is not required if a fire occurs in area C-15. Therefore, loss of DC power to these relays will not impact PFSSD.
NK4421	Pressurizer PORV BBPCV0456A	The pressurizer PORV fails closed on loss of DC power which is the desired PFSSD position. Therefore, loss of DC power will not impact PFSSD.
NK0405	NK54 NK5400	This is on the incoming line to 125 VDC distribution switchboard NK54. Damage to this component will de-energize NK54. The PFSSD switches and components that are affected are discussed below.

Potential Impact on Loss of Train B Class 1E 125 VDC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NK5401	Load Center NG02 Breaker Control	Loss of control power for NG02 breakers will prevent operation of the associated equipment from the control room. Redundant Train A components fed from NG01 and NG03 are available. Therefore, loss of DC power will not impact PFSSD.
NK5409	ESFAS Cabinet SA036B	SA036B is the Channel IV termination cabinet. Loss of DC power will prevent operation of associated Channel IV ESFAS signals but will not prevent operation of PFSSD equipment from the control room. Therefore, loss of DC power will not impact PFSSD.
NK5410	Reactor Trip Switchgear Cabinet SB102B	SB102B is the Train B reactor trip switchgear cabinet. Loss of power will prevent operation of the Train B reactor trip functions but redundant Train A reactor trip switchgear cabinet SB102A remains available. Therefore, loss of DC power will not impact PFSSD.
NK5412	Channel 1 and 4 Load Shed/Sequencer Panel NF039C	Loss of DC power from NK5412 to NF039C will prevent operation of the Train B load shedder/sequencer. Offsite power is available on Train B based on XX-E-013, Appendix 2. Therefore, loss of DC power will not impact PFSSD.
NK5414	Diesel Generator Control Panel KJ122	Panel KJ122 is the Train B emergency diesel generator control panel. Loss of DC power will prevent operation of the Train B emergency diesel generator. Train B offsite power is available based on XX-E-013, Appendix 2. Therefore, loss of DC power will not impact PFSSD.
NK5423	Main Steam and Feedwater Isolation Cabinet SA075B	SA075B is the Train B MSFIS cabinet. Loss of DC power to SA075B will cause the MSIVs and MFIVs to close, which is the desired PFSSD position. Therefore, loss of DC power will not impact PFSSD.
NK5424	Diesel Generator Panel NE106	Panel NE106 is the Train B emergency diesel generator control and relay panel. Loss of DC power will prevent operation of the Train B emergency diesel generator. Train B offsite power is available based on XX-E-013, Appendix 2. Therefore, loss of DC power will not impact PFSSD.
NK0411	Inverter NN14	See Section 5.1.3 for PFSSD impact on loss of Class 1E 120 VAC electrical distribution.

Based on the above discussion, a loss of Train B Class 1E 125 VDC power will not adversely impact safe shutdown. In addition, Train A Class 1E 125 VDC power is unaffected by a fire in this area.

References: XX-E-013, E-15000, E-11NK02, E-13AB01, E-13AB01A, E-13AB30, E-13BB30, E-13BB40, E-13BM06A, E-13EG16, E-13EM04, E-13EM04A, E-13EP02A, E-13FC21, E-13GM04A, E-13FC23, E-13FC24, E-13KJ03A, E-13NB15, E-13NE13, E-13NF01, E-13NK10, E-13RL01, E-13RL02, E-13RL03, E-13RL04, E-13RL05, E-13RL06, E-13RL07, E-13RP11, E-13RP15, E-13SA21, E-13SB05, E-13SB10, E-K3EF01A, E-1F9101, E-1F9103, E-1F9202, E-1F9205, E-1F9421, E-1F9422B, E-1F9432, E-1F9433, E-10NK, E-093-00054, E-093-00055, E-093-00057, E-093-00058, J-104, J-10SA, J-104-00390, M-12BG01, M-12EG02, M-12GM01

5.1.3 Class 1E 120 VAC Electrical Distribution System

The PFSSD function of the Class 1E 120 VAC system is to supply a reliable source of 120 VAC power to vital PFSSD equipment. Four Class 1E 120 VAC distribution switchboards are provided, two per train. The primary power source to each switchboard is from the Class 1E 125 VDC system through an inverter. Each inverter has a backup 480 VAC power supply from the Class 1E 480 VAC system. Two swing inverters, one per safety Train, are installed as a backup to the primary inverter and can be placed in service in the event of a failure or for maintenance of the primary inverter. The swing inverters are powered from the Class 1E 125 VDC system and Class 1E 480 VAC system.

Terminal box TB34120 provides a termination point for the power cable from NG02AFF3 to inverter NN14. The impact on PFSSD due to loss of power to NN14 is discussed in the table below.

A fire in area C-15 can cause a loss of Train B Class 1E 120 VAC switchboards NN02 and NN04. The following table identifies the PFSSD components that will be affected by a loss of Train B Class 1E 120 VAC electrical distribution system as well as the potential impact on PFSSD if power is lost.

Potential Impact on Loss of Train B Class 1E 120 VAC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
N/A	NN12	Damage to 7.5kVA inverter NN12 will prevent the primary power source from energizing NN02. The alternate power source from swing inverter NN16 may also be affected. The PFSSD impact on loss of NN02 is discussed in the individual switch evaluations below.
N/A	NN14	Damage to 7.5kVA inverter NN14 will prevent the primary power source from energizing NN04. The alternate power source from swing inverter NN16 may also be affected. The PFSSD impact on loss of NN04 is discussed in the individual switch evaluations below.
NN0201	120 VAC Switchboard NN02 Power Supply	Damage to this switch will prevent energizing NN02 from both inverter NN12 and swing inverter NN16. The PFSSD impact on loss of NN02 is discussed in the individual switch evaluations below.

Potential Impact on Loss of Train B Class 1E 120 VAC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NN0401	120 VAC Switchboard NN04 Power Supply	Damage to this switch will prevent energizing NN04 from both inverter NN14 and swing inverter NN16. The PFSSD impact on loss of NN04 is discussed in the individual switch evaluations below.
NN0203	BOP Instrument Rack RP147A	The only PFSSD component affected by a loss of NN0203 is ABPV0002. PFSSD is assured using the Train A MDAFP to supply steam generator C (See Calculation WCNOC-CP-002). Therefore, loss of AC power will not impact PFSSD.
NN0204 NN0405	LSELS Panel NF039B	Panel NF039B has four sources of Class 1E 120 VAC power, each from separate 120 VAC distribution switchboards, two on Train A and two on Train B. The LSELS system operates when a degraded voltage condition exists on 2 out of 4 sensors on a single 4,160 volt Class 1E bus. Loss of AC power from NN0204 and NN0405 to NF039B will have no adverse impact on PFSSD since 120 VAC power remains available from NN0106 and NN0303 to NF039B to ensure operation of Train B LSELS. Therefore, loss of AC power will not impact PFSSD.
NN0205	ESFAS Panel SA036C	SA036C is the Channel II logic and termination cabinet. Panel SA036C controls automatic safety features associated with both trains of auxiliary feedwater. Loss of AC power will not prevent manual operation of auxiliary feedwater. Therefore, loss of AC power will not impact PFSSD.
NN0206 NN0407	LSELS Panel NF039A	Panel NF039A has four sources of Class 1E 120 VAC power, each from separate 120 VAC distribution switchboards, two on Train A and two on Train B. The LSELS system operates when a degraded voltage condition exists on 2 out of 4 sensors on a single 4,160 volt Class 1E bus. Loss of AC power from NN0206 and NN0407 to NF039A will have no adverse impact on PFSSD since 120 VAC power remains available from NN0108 and NN0305 to NF039A to ensure operation of Train A LSELS. Therefore, loss of AC power will not impact PFSSD.

Potential Impact on Loss of Train B Class 1E 120 VAC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NN0208	BOP Instrument Rack RP053DA	The PFSSD components that are affected by a loss of 120 VAC power to RP053DA are ALPT0038, ALPT0026 and ABPV0002. Loss of power to ALPT0038 will not affect PFSSD due to the availability of ALPT0037 and ALPT0039 to ensure ESFAS LSP swapover. However, as discussed below for switches NN0416 and NN0418, ALPT0039 could also lose power. This could prevent swapover to ESW on low CST level. This is acceptable since the CST is unaffected by the fire and contains sufficient volume to maintain PFSSD hot standby conditions. In addition, pressure indicators ALPI0025A and ALPI0037 are available to indicate low suction pressure in the control room and operators can swap to ESW from the control room. Loss of power to ALPT0026 will not affect PFSSD due to the availability of Train A MDAFP. Loss of power to ABPV0002 will not affect PFSSD since ABPV0003 is available to control cooldown and the local controller for ABPV0002 can be used if necessary for cold shutdown. Therefore, loss of AC power will not impact PFSSD.
NN0209 NN0410	SSPS Train B Input Panel SB032A	Panel SB032A has four sources of Class 1E 120 VAC input power, one source per channel. NN0209 provides 120 VAC power to channel II and NN0410 provides 120 VAC power to channel IV. Loss of two sources of power will render these channels inoperable but the remaining two channels remain operable. The SSPS operates on a 2/3 or 2/4 logic. Therefore, loss of two channels on a train will not prevent the SSPS from performing it's function. The loss of power will send a general warning signal for the train and place the SSPS in a partial trip condition. Loss of power on the other train will actuate the SSPS and trip the plant, which is acceptable for PFSSD. Therefore, loss of AC power will not impact PFSSD.

Potential Impact on Loss of Train B Class 1E 120 VAC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NN0210 NN0409	SSPS Train A Input Panel SB029A	Panel SB029A has four sources of Class 1E 120 VAC input power, one source per channel. NN0210 provides 120 VAC power to channel II and NN0409 provides 120 VAC power to channel IV. Loss of two sources of power will render these channels inoperable but the remaining two channels remain operable. The SSPS operates on a 2/3 or 2/4 logic. Therefore, loss of two channels on a train will not prevent the SSPS from performing it's function. The loss of power will send a general warning signal for the train and place the SSPS in a partial trip condition. Loss of power on the other train will actuate the SSPS and trip the plant, which is acceptable for PFSSD. Therefore, loss of AC power will not impact PFSSD.
NN0211 NN0406 NN0408	NIS2 Panel SE054B Source Range Monitor SENY0061A/B	Panel SE054B is associated with source range neutron monitor SENI0032B. Loss of power to the panel will prevent SENI0032B from operating. In addition, power to source range monitor SENY0061A/B could be lost. Source range monitoring remains available using SENI0031B and SENI0060A. Therefore, loss of AC power will not impact PFSSD.

Potential Impact on Loss of Train B Class 1E 120 VAC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NN0212 NN0414	Process Protection Set 2 Panel SB042 Process Protection Set 4 Panel SB041	Panel SB042 is the Channel II process protection rack. Panel SB041 is the Channel IV process protection rack. Loss of 120 VAC power will prevent operation of Channels II and IV inputs to the reactor protection system. The remaining two channels will remain operable. The SSPS operates on a 2/3 or 2/4 logic. Therefore, loss of two channels will not prevent the SSPS from performing it's function. PFSSD transmitters powered from NN0212 are ABPT0515, ABPT0525, ABPT0535, ABPT0545, AELT0519, AELT0549, AELT0552, AELT0553, BBPT0403, BBPT0456, BBTE0413B, BBTE0433A, BNLT0931 and GNPT0936. PFSSD transmitters powered from NN0414 are ABPT0516, ABPT0546, AELT0517, AELT0527, AELT0537, AELT0547, BBPT0458, BGFT0215B, BGLT0185, BNLT0933 and GNPT0934. These transmitters and associated control room indicators are not credited in the event of a fire in this area. Redundant instrumentation powered from alternate sources of power is available. Therefore, loss of AC power will not impact PFSSD. Also see Section 5.2.2 for discussion on loss of RCS temperature indication.
NN0217	Fire Isolation Panel SB148A	Panel SB148A receives signals from certain field transmitters (BBLT0460, BBTE0423, AELT0502 and BBTE0443) and sends the signals to the control room and the auxiliary shutdown panel (ASP). This ensures reliable diagnostic instrumentation is available at the ASP if a fire occurs in the control room. Loss of 120 VAC power to SB148A will prevent signals from these transmitters from reaching the control room and the ASP. However, redundant diagnostic instrumentation remains available in the control room. Therefore, loss of AC power will not impact PFSSD.
NN0403	ESFAS Panel SA036B	SA036B is the Channel IV termination cabinet. Loss of AC power will prevent operation of associated Channel IV ESFAS signals but will not prevent operation of PFSSD equipment from the control room. Therefore, loss of AC power will not impact PFSSD.

Potential Impact on Loss of Train B Class 1E 120 VAC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NN0404	BOP Instrument Rack RP147B	The PFSSD components controlled by instrument rack RP147B are ABPV0004, ALHV0005, ALHV0010, ALFT0001 and ALPT0024. Loss of 120 VAC power to RP147B will not impact PFSSD since these components are not credited if a fire occurs in this area. Therefore, loss of AC power will not impact PFSSD.
NN0412	SSPS Train B #2 Output Panel SB032D	Loss of 120 VAC power to SB032D will prevent operation of the Train B SSPS. The Train A output panels are unaffected by a fire in this area. Therefore, loss of AC power will not impact PFSSD.
NN0416 NN0418	BOP Instrument Rack RP053BC	The PFSSD components affected by a loss of 120 VAC power to RP053BC are ABPV0004, ALFT0007, ALHV0005, ALHV0007, ALHV0010, ALHV0012, ALPI0024A, ALPT0039, EFFT0054, EFPT0002, EGFT0129, EGPT0078, GDTE0011 and JELT0021. Loss of power to ALPT0039 is discussed above for switch NN0208. Loss of power to the remaining components will not adversely impact PFSSD since these components are not credited if a fire occurs in this area. Therefore, loss of AC power will not impact PFSSD.
NN0420	Fire Isolation Panel SB148B	Panel SB148B receives signals from certain field transmitters (AELT0504, BBPT0406) and sends the signals to the control room and the auxiliary shutdown panel (ASP). This ensures reliable diagnostic instrumentation is available at the ASP if a fire occurs in the control room. Loss of 120 VAC power to SB148B will prevent signals from these transmitters from reaching the control room and the ASP. However, redundant diagnostic instrumentation remains available in the control room. Therefore, loss of AC power will not impact PFSSD.
NN0422	Train B Control Room A/C Unit Inlet & Discharge Dampers GKHZ0040A & GKHZ0040B	Loss of 120 VAC power from NN0422 will impact only Train B inlet & discharge dampers GKHZ0040A & 40B. Train A dampers are unaffected by a fire in this area. Therefore, loss of AC power will not affect PFSSD.

The only potential PFSSD impact identified in the above discussion is that steam generator B ARV ABPV0002 could fail closed. Only the Train A motor driven auxiliary feedwater pump (MDAFP) is available to supply steam generators B and C. The Train B MDAFP and the TDAFP may be unavailable. Per Calculation WCNOC-CP-002, hot standby can be maintained using a single steam generator ARV. Therefore, the configuration is acceptable.

Based on the above discussion, a loss of Class 1E 120 VAC power will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13AB20B, E-13AE08, E-13AL03B, E-13AL05B, E-13AL07B, E-13BB15, E-13BB16, E-13EG19, E-13FC24, E-13NF01, E-13NN01, E-13RP09, E-13SA21, E-13SB01, E-13SB02, E-13SB16, E-13SE07, E-10NF, E-00NN, J-10SA, E-1F9101, E-1F9204, E-1F9411A, E-1F9411B, E-1F9421, E-1F9431, E-1F9432, J-104-00390, J-110-00218, J-110-00219, J-110-00588, J-110-00590, J-110-00595, J-110-00596, J-110-00642, J-110-00647, J-110-00942, M-12AL01, M-767-00189, M-767-00313 (Page 017)

5.2 PFSSD CABLE EVALUATION

Table C-15-4 lists all the PFSSD cables (S. in E-15000) located in fire area C-15. The applicable evaluation section is also listed in Table C-15-4.

Table C-15-4
PFSSD Cables Located in Fire Area C-15

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12NFY01CA	3410	NF039A	P	5.1.3	120 VAC Power to NF039A from NN0206
12NFY01DA	3410	NF039B	P	5.1.3	120 VAC Power to NF039B from NN0204
12NNK01LA	3410	NN16	P	5.1.2	125 VDC Power to Swing Inverter NN16
12NNK01LB	3410	NN16	P	5.1.2	125 VDC Power to Swing Inverter NN16
12NKK02AA	3410, 3411	NK02	P	5.1.2	Train B Class 1E 125 VDC Bus
12NKK02AB	3410, 3411	NK02	P	5.1.2	Train B Class 1E 125 VDC Bus
12NKK02AF	3410	NK72	P	5.1.2	Battery Chgr NK22/NK26 Xfer Switch (NK02)
12NKK02AH	3410	NK42	P	5.1.2	Train B Class 1E 125VDC Switchboard
12NKK02AJ	3410	NK42	P	5.1.2	Train B Class 1E 125VDC Switchboard
12NKK02AM	3410	NK72	P	5.1.2	Battery Chgr NK22/NK26 Xfer Switch (NK02)
12NKK02AW	3410	NK02	P	5.1.2	Train B Class 1E 125 VDC Bus
12NKK02AX	3410	NK02	P	5.1.2	Train B Class 1E 125 VDC Bus
12NKK02AY	3410	NK02	P	5.1.2	Train B Class 1E 125 VDC Bus
12NKK02AZ	3410	NK02	P	5.1.2	Train B Class 1E 125 VDC Bus
12NNY01CA	3410	NN02	P	5.1.3	120 VAC Power to NN02 from Inverter NN12
12NNY01CB	3410	NN02	P	5.1.3	120 VAC Power to NN02 from Inverter NN12
12NNY01CC	3410	NN12	P	5.1.3	125 VDC Power to Inverter NN12
12NNY01CD	3410	NN12	P	5.1.3	125 VDC Power to Inverter NN12
12NNY01GA	3410	NN12	P	5.1.3	120 VAC Pwr to NN12 from Swing Inv NN16
12NNY01GB	3410	NN12	P	5.1.3	120 VAC Pwr to NN12 from Swing Inv NN16
12RLK01AA	3410	RL005/RL006	P	5.1.2	Turbine Generator & Feedwater Control Panel
12RPK09AA	3410	RP266	P	5.1.2	Auxiliary Relay Rack
12RPK09BA	3410	RP334	P	5.1.2	Auxiliary Relay Rack

Table C-15-4
PFSSD Cables Located in Fire Area C-15

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12RPY09AA	3410	RP053DA	P	5.1.3	BOP Instrument Rack
12RPY09BA	3410	RP147A	P	5.1.3	BOP Instrument Rack
12SAK21CA	3410	SA036C	P	5.1.2	125 VDC to ESFAS Channel 2 Term Cab from NK4205
12SAY21CA	3410	SA036C	P	5.1.3	120 VAC to ESFAS Channel 2 Term Cab from NN0205
12SBS01BD	3410	SB029A	P	5.1.3	120 VAC to SSPS A Input Panel from NN0210
12SBS02BD	3410	SB032A	P	5.1.3	120 VAC to SSPS B Input Panel from NN0209
12SBY09DA	3410	SB042	P	5.1.3 5.2.2	120 VAC to Process Protection Set 2 Panel from NN0212
12SBY09GA	3410	SB148A	P	5.1.3 5.2.2	120 VAC to Control Room Isolation Cabinet from NN0217
12SES02AA	3410	SE054B	P	5.1.3	120 VAC to Nuclear Instrument Panel from NN0211
14ABK30BB	3403, 3404	SA075B	P	5.1.2	125 VDC to MSFIS Cabinet SA075B
14BBK40BL	3403, 3404	BBPCV0456A	P	5.1.2	PZR Power Operated Relief Valve
14GKG13BA	3403, 3404	SGK05B	P	5.2.1	Class 1E Elec. Equip. Room A/C Unit B
14GKG13BH	3403, 3404	SGK05B	C	5.2.1	Class 1E Elec. Equip. Room A/C Unit B
14GKG13BK	3403, 3404	SGK05B	C	5.2.1	Class 1E Elec. Equip. Room A/C Unit B (GKHS0103)
14GKG13BM	3403, 3404	SGK05B	C	5.2.1	Class 1E Elec. Equip. Room A/C Unit B (GKHS0103)
14GKY02BF	3403, 3404	GKHZ0040A/B	P	5.2.4	Control Room A/C Unit B Return and Supply Dampers
14KJK03AA	3403, 3404	KKJ01B	P	5.1.2	Train B Emergency Diesel Engine

Table C-15-4
PFSSD Cables Located in Fire Area C-15

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NBK15AA	3403, 3404	NB002	P	5.1.2	NB02 DC Breaker Control Power
14NBK15AB	3403, 3404	NB002	P	5.1.2	NB02 DC Breaker Control Power
14NEK13AA	3403, 3404	NE106	P	5.1.2	Train B D/G Exciter Control Power
14NFK01AA	3403, 3404	NF039C	P	5.1.2	DC Power to Load Shed/Seq Pnl Ch 1 & 4 Terms
14NFY01GA	3403, 3404	NF039A	P	5.1.3	AC Power to Load Shed/Seq Ch 1 Logic
14NFY01HA	3403, 3404	NF039B	P	5.1.3	AC Power to Load Shed/Seq Ch 4 Logic
14NGK11AA	3403, 3404	NG00201	P	5.1.2	Bus NG02 DC Breaker Control Power
14NGK11AB	3403, 3404	NG00201	P	5.1.2	Bus NG02 DC Breaker Control Power
14NGK11BA	3403, 3404	NG00401	P	5.1.2	Bus NG04 DC Breaker Control Power
14NGK11BB	3403, 3404	NG00401	P	5.1.2	Bus NG04 DC Breaker Control Power
14NKG10BA	3410	NK22	P	5.1.2	480 VAC Power to NK22
14NKG10DA	3404	NK24	P	5.1.2	480 VAC Power to NK24
14NKK02A1	3404	NK04	P	5.1.2	Train B Class 1E 125 VDC Bus
14NKK02A2	3404	NK04	P	5.1.2	Train B Class 1E 125 VDC Bus
14NKK02AA	3404, 3405	NK04	P	5.1.2	Train B Class 1E 125 VDC Bus
14NKK02AF	3404	NK74	P	5.1.2	Battery Chgr NK24/NK26 Xfer Switch (NK04)
14NKK02AG	3404	NK74	P	5.1.2	Battery Chgr NK24/NK26 Xfer Switch (NK04)
14NKK02AH	3404	NK44	P	5.1.2	Train B Class 1E 125VDC Switchboard
14NKK02AK	3404	NK54	P	5.1.2	Train B Class 1E 125VDC Switchboard
14NKK02AL	3404, 3405	NK04	P	5.1.2	Train B Class 1E 125 VDC Bus
14NKK02AN	3404	NK44	P	5.1.2	Train B Class 1E 125VDC Switchboard
14NKK02AP	3404	NK54	P	5.1.2	Train B Class 1E 125VDC Switchboard

Table C-15-4
PFSSD Cables Located in Fire Area C-15

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NKK02AY	3404	NK04	P	5.1.2	Train B Class 1E 125 VDC Bus
14NKK02AZ	3404	NK04	P	5.1.2	Train B Class 1E 125 VDC Bus
14NKY12BA	3404	NK26	C	5.1.2	Train B Swing Battery Charger
14NKY12BB	3404, 3410	NK26	C	5.1.2	Train B Swing Battery Charger
14NKY12BD	3410	NK26	C	5.1.2	Train B Swing Battery Charger
14NNG01AA	3403, 3404	NN14	P	5.1.3	480 VAC Power to Inverter NN14
14NNG01AB	3404	NN14	P	5.1.3	480 VAC Power to Inverter NN14
14NNG01BA	3403, 3404, 3410	NN12	P	5.1.3	480 VAC Power to Inverter NN12
14NNK01MA	3403, 3404	NN16	P	5.1.2	125 VDC Power to Swing Inverter NN16
14NNK01MB	3403, 3404	NN16	P	5.1.2	125 VDC Power to Swing Inverter NN16
14NNY01DA	3404	NN04	P	5.1.3	120 VAC Power to NN04 from Inverter NN14
14NNY01DB	3404	NN04	P	5.1.3	120 VAC Power to NN04 from Inverter NN14
14NNY01DG	3404	NN14	P	5.1.3	125 VDC Power to Inverter NN14
14NNY01DH	3404	NN14	P	5.1.3	125 VDC Power to Inverter NN14
14NNY01HA	3403, 3404	NN14	P	5.1.3	120 VAC Pwr to NN14 from Swing Inv NN16
14NNY01HB	3403, 3404	NN14	P	5.1.3	120 VAC Pwr to NN14 from Swing Inv NN16
14PNG01AA	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
14PNG01AD	3403, 3404	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
14RLK01AA	3403, 3404	RL001/RL002	P	5.1.2	125 VDC to RL001/RL002 from NK4407
14RLK01BA	3403, 3404	RL005/RL006	P	5.1.2	125 VDC to RL005/RL006 from NK4409
14RLK01CA	3403, 3404	RL017/RL018	P	5.1.2	125 VDC to RL017/RL018 from NK4412
14RLK01DA	3403, 3404	RL019/RL020	P	5.1.2	125 VDC to RL019/RL020 from NK4413
14RLK01EA	3403, 3404	RL021/RL022	P	5.1.2	125 VDC to RL021/RL022 from NK4414

Table C-15-4
PFSSD Cables Located in Fire Area C-15

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14RLK01FA	3403, 3404	RL023/RL024	P	5.1.2	125 VDC to RL023/RL024 from NK4411
14RPK09AA	3403, 3404	RP210	P	5.1.2	125 VDC to RP210 from NK4417
14RPK09BA	3403, 3404	RP140	P	5.1.2	125 VDC to RP140 from NK4415
14RPK09NA	3403, 3404	RP335	P	5.1.2	125 VDC to RP335 from NK4419
14RPY09BA	3403, 3404	RP053BC	P	5.1.3	120 VAC Power to RP053BC from NN0416
14RPY09CA	3403, 3404	RP053BC	P	5.1.3	120 VAC Power to RP053BC from NN0418
14RPY09GA	3403, 3404	RP147B	P	5.1.3	120 VAC Power to RP147B from NN0404
14SAK21BA	3403, 3404	SA036B	P	5.1.2	125 VDC Power to SA036B from NK5409
14SAY21BA	3403, 3404	SA036B	P	5.1.3	120 VAC Power to SA036B from NN0403
14SAZ20HA	3403, 3404	SGK05B	C	5.2.1	Status Panel SA066B Input from SGK05B
14SBS01DC	3403, 3404	SB029A	P	5.1.3	120 VAC Power to SB029A from NN0409
14SBS02DC	3403, 3404	SB032A	P	5.1.3	120 VAC Power to SB032A from NN0410
14SBS05BE	3403, 3404	SB032D	P	5.1.3	120 VAC Power to SB032D from NN0412
14SBS05BF	3403, 3404	SB032D	P	5.1.2	125 VDC Power to SB032D from NK4416
14SBS10BB	3403, 3404	SB102B	P	5.1.2	125 VDC Power to SB102B from NK5410
14SBY09FA	3403, 3404	SB041	P	5.1.3	120 VAC to Panel SB041 from NN0414
14SBY09HA	3403, 3404	SB148B	P	5.1.3	120 VAC to Panel SB148B from NN0420
14SES07BA	3403, 3404	SENY0061B	P	5.1.3	120 VAC Power to SENY0061B from NN0408
14SES07CA	3403, 3404	SENY0061A	P	5.1.3	120 VAC Power to SENY0061A from NN0406
16GKK31DB	3403	SGK05B	C	5.2.1	Fire Isolation Signal (95XGK08)
16KCQ21EA	3403	SGK05B	C	5.2.1	Fire Detection Actuation Circuit
16KCQ21FA	3403	SGK05A	C	5.2.1	Fire Detection Actuation Circuit
16KCQ21HA	3403	SGK05B	C	5.2.1	Fire Detection Actuation Circuit

Table C-15-4
PFSSD Cables Located in Fire Area C-15

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16KCQ21JA	3403	SGK05A	C	5.2.1	Fire Detection Actuation Circuit
16PNY01A1	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01A2	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01A3	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01A4	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01A5	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01AA	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01AB	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01AC	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01AH	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01AJ	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01AK	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01AL	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01AM	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01AN	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01AP	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01AQ	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01AR	3403	XPN08D	P	5.1.1	Alternate feed to PN08 from PG20GER5
16PNY01AS	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01AT	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01AU	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01AV	3403	PN08	P	5.1.1	120 VAC Non-Class 1E Distribution Swbd
16PNY01AW	3403	PN08A	P	5.1.1	Voltage Regulator Panel 22.5 KVA

Table C-15-4
PFSSD Cables Located in Fire Area C-15

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16PNY01AX	3403	PN08A	P	5.1.1	Voltage Regulator Panel 22.5 KVA
16PNY01AY	3403	PN08A	P	5.1.1	Voltage Regulator Panel 22.5 KVA
16PNY01AZ	3403	PN08A	P	5.1.1	Voltage Regulator Panel 22.5 KVA
16RLY01DA	3403	PN0833	P	5.1.1	120 VAC to ESF Control Pnl (RL017/RL018)
16RLY01EA	3403	PN0835	P	5.1.1 5.2.2	120 VAC to Rx Aux Control Pnl (RL021/RL022)
16RPY10AA	3403	PN10	P	5.2.3	Non-Class 1E 120 VAC Inverter

5.2.1 Class 1E Electrical Equipment Room Air Conditioning

Class 1E electrical equipment room air conditioning is required to satisfy the PFSSD support function of maintaining cooling within the Class 1E electrical equipment rooms. Either the Train A or Train B (depending on the credited train) room cooler is required to be operable to ensure adequate room cooling.

Power and control cables associated with Train B Class 1E electrical equipment room A/C unit SGK05B are run in fire area C-15. Damage to these cables could prevent operation of SGK05B. In addition, a fire in this area will initiate the fire detection and Halon actuation system, causing SGK05B to shut down. Therefore, the Train B Class 1E electrical equipment room A/C unit SGK05B is unavailable if a fire occurs in area C-15.

Cables 16KCQ21FA and 16KCQ21JA are associated with the fire detection and Halon actuation system for Train A Class 1E switchboard rooms 3414 and 3408, respectively. A hot short in either of these cables will cause a Halon actuation in the respective room and shut down, or prevent from starting, the Train A Class 1E electrical equipment room A/C unit SGK05A. As stated throughout this document, a number of Train B components could be affected by a fire in this area but Train A components are available. Therefore, the Train A Class 1E electrical equipment room A/C unit is required to be operable in the event of a fire in this area.

If a fire occurs in area C-15 that causes SGK05A to shut down, or prevent it from being started, operators can bypass the fire isolation signal by placing GKHS0101 in bypass then starting the unit normally. GKHS0101 is located on panel RP068 in the main control room.

Based on the above discussion, the Train A Class 1E electrical equipment room A/C unit SGK05A is available in the event of a fire in area C-15.

References: XX-E-013, E-15000, E-13GK31, E-13KC21, M-658-00042, M-658-00043

5.2.2 RCS Temperature Indication

Reactor coolant system (RCS) hot and cold leg temperature indication is required to verify that RCS decay heat removal has been established, either by forced circulation or natural circulation. The PFSSD methodology requires wide range hot leg and cold leg temperature indication to be available on at least one RCS loop. The following table identifies the hot and cold leg temperature components credited for PFSSD as well as the components power supply.

RCS Loop	Hot Leg Temperature	Power Supply	Cold Leg Temperature	Power Supply
1	BBTE0413A/BBTI0413A	NN0111	BBTE0413B/BBTI0413B	NN0212
2	BBTE0423A/BBTI0423A BBTR0423	NN0111 PN0738	BBTE0423B/BBTI0423B	NN0217
3	BBTE0433A BBTR0433	NN0212 PN0835	BBTE0433B BBTR0433	NN0111 PN0835
4	BBTE0443A BBTR0443	NN0212 PN0835	BBTE0443B BBTR0443	NN0111 PN0835

Class 1E 120 VAC power from NN0212 to process rack SB042 (Cable 12SBY09DA) and from NN0217 to fire isolation rack SB148A (Cable 12SBY09GA) could be disrupted as discussed in Section 5.1.3. In addition, non-class 1E power from PN0835 to temperature recorders BBTR0433 and BBTR0443 (Cable 16RLY01EA) could be disrupted as discussed in Section

5.1.1. If this occurs, cold leg temperature indication on all four loops and hot leg temperature indication on loops 3 and 4 will be lost. Hot leg temperature indication on loops 1 and 2 remains available.

EMG ES-04 provides alternate indication that may be used. One of these methods verifies that steam generator pressure is stable or decreasing. As stated earlier, the Train A MDAFP is available to supply steam generators B and C. Steam generator B pressure instruments ABPT524 and ABPT526 and steam generator C pressure instruments ABPT0003, ABPT0534 and ABPT0536 are unaffected by a fire in C-15 and can be used per EMG ES-04 to verify heat removal in loops 2 and 3.

The configuration is acceptable because, in the event of a fire in fire area C-15, cooldown will be performed using RCS loops 2 and 3. RCS loop 2 wide range hot leg temperature element BBTE423A as well as steam generators B and C pressure transmitters ABPT0003, ABPT524, ABPT526, ABPT0534 and ABPT0536 will provide indication.

References: E-15000, XX-E-013, E-13RL06, E-13BB15, E-1F9201, M-12AB01, M-12BB01, EMG ES-04

5.2.3 Steam Generator Feedwater Pumps

Main feedwater pump steam supply valves FCFV0005 and FCFV0105 are credited in the PFSSD analysis to trip the main feedwater pumps if the main steam isolation valves (MSIVs) are affected by a fire. Closing the MSIVs stops steam flow to the feedwater pumps' turbines and stops the feedwater pumps. The steam generator feedwater pumps are tripped in the event of a fire to prevent overfilling the steam generators.

Non-Class 1E 120 VAC Inverter PN10 and distribution panel PN10A provide power to FCFV0105 trip relays in panel FC170C. Cable 16RPY10AA supplies power from PN0806 to inverter PN10. Damage to this cable could prevent the ability to close valve FCFV0105 to stop steam flow to steam generator feedwater pump PAE01B.

A fire in area C-15 will not affect the ability to close the MSIVs from the control room. All-close hand switches ABHS0079 and ABHS0080 are unaffected and can be used to close the MSIVs from the control room.

Based on the above discussion, valve FCFV0105 may not close if a fire occurs in this area. However, the MSIVs can be closed using either hand switch ABHS0079 or ABHS0080 in the main control room. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-13RP10, E-1F9103, E-1F9421

5.2.4 Control Room Air Conditioning

Power cables associated with Train B Control Room A/C unit supply and return dampers GKHZ0040A and GKHZ0040B are run in area C-15. Damage to these cables could prevent operation of the associated dampers. Circuits for Train A Control Room A/C unit dampers do not run in area C-15.

Based on the above discussion, Control Room environmental conditions will be unaffected by a fire in area C-15.

References: XX-E-013, E-15000, E-13GK02C, E-1F9421, E-1F9442, M-12GK01

FIRE AREA C-16

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-16 is located on the 2016 elevation of the Control Building and includes the rooms listed in Table C-16-1.

Table C-16-1
Rooms Located in Fire Area C-16

ROOM #	DESCRIPTION
3407	Battery Room No. 1
3408	Switchboard Room No. 1
3409	Non-Vital Swgr & Xfmr Room No. 1
3413	Battery Room No. 3
3414	Switchboard Room No. 3

Fire area C-16 is protected with an automatic Halon fire suppression system. In addition, automatic fire detection is installed throughout. The fire area is separated from adjacent fire areas by minimum 3-hour fire resistant construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-16-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-16-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-16

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Power to steam generators A and C ARVs ABPV0001 and ABPV0003 could be lost, preventing control of the ARVs from the control room and failing the ARVs closed. Steam generators B and D ARVs are unaffected. As stated in the AL system comments, the Train B MDAFP is available to supply steam generator D and the TDAFP is available to supply steam generator B. Train A MSFIS cabinet SA075A could lose power, causing the MSIVs to fail closed, which is the desired PFSSD position.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
AE	Main Feedwater	H, P	Train A MSFIS cabinet SA075A could lose power, causing the MFIVs to fail closed, which is the desired PFSSD position.
AL	Aux. Feedwater System	H, P	The Train A motor driven auxiliary feedwater pump (MDAFP) may not be available due to loss of control power to NB01. The Train B MDAFP and the turbine driven auxiliary feedwater pump (TDAFP) are unaffected. ESFAS LSP signals from ALPT0037 could be affected. ESFAS LSP signals from ALPT0038 and ALPT0039 are unaffected, which will ensure swapover to ESW on low suction pressure from the condensate storage tank.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
BB	Reactor Coolant System	R, M, H, P, S	Cold leg temperature indication on RCS loops 3 and 4 could be unavailable. Hot leg temperature indication on RCS loops 1 and 2 could be unavailable. Pressurizer PORV BBPCV0455A could lose 125 VDC power and fail closed, which is the desired PFSSD position. Reactor head vent valves BBHV8001A and BBHV8002A could lose power, failing the valves closed which is the desired PFSSD position.
BG	Chemical and Volume Control System	R, M, S	The Train A CCP may not be available due to loss of control power to NB01. The Train B CCP is available. Excess letdown valves BGHV8153A and BGHV8154A could lose power, causing the valves to fail closed which is the desired PFSSD position. RCP seal injection total flow indicator BGFI0215A may be affected due to loss of 120 VAC power to SB038. Flow indicator BGFI0215B is unaffected.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.

Table C-16-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-16

System	System Name	PFSSD Function*	Comments
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
EF	Essential Service Water System	H, S	The Train A ESW pump could be affected. The Train B ESW pump is unaffected.
EG	Component Cooling Water System	S	The Train A component cooling water pumps (DPEG01A and DPEG01C) may not be available due to loss of control power to NB02. Power to Train A temperature control valve EGTV0029 could be lost, failing the valve closed. This would prevent temperature control on the Train A CCW system but will not prevent the system from performing it's PFSSD functions. Train B CCW system is unaffected. CCW to RCP flow indicator EGFI0128 may be affected due to loss of 120 VAC power to RP053A. Flow indicator EGFI0129 is unaffected.
EJ	Residual Heat Removal System	M, H, P	The Train A RHR system may not be available due to loss of control power to NB01. The Train B RHR system is available. Train A RHR discharge valve EJHCV0606 could be affected. Train B RHR discharge valve EJHCV0607 is unaffected.
EM	High Pressure Coolant Injection	R, M	Valve EMHV8964 could lose power, failing the valve closed which is the desired PFSSD position.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
EP	Safety Injection Accumulators	H	Position indication for accumulator injection valves EPHV8808A and EPHV8808C could be affected due to loss of 125 VDC power to the hand switch indicating lights. This will not affect the ability to close the valves from the control room using the respective hand switches.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
FC	Auxiliary Turbines	R, H, P	Valve FCFV0005 may be affected. The MSIVs can be closed using all-close hand switches ABHS0079 or ABHS0080.
GD	ESW Pump House HVAC	S	Train A ESW pump house temperature element GDTE0001, temperature switch GDTSL0001 and damper actuator GDTZ0001A could be affected. Train B ESW pump house HVAC is unaffected.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.

Table C-16-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-16

System	System Name	PFSSD Function*	Comments
GK	Control Room and Class 1E Switchgear Room Coolers	S	Train A control room cooler SGK04A supply and return dampers GKHZ0029B and GKHZ0029A are affected. The Train B control room cooler SGK04B supply and return dampers GKHZ0040A and GKHZ0040B are unaffected. The Train A Class 1E electrical equipment room cooler SGK05A is affected. The Train B Class 1E electrical equipment room cooler SGK05B is unaffected.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
GM	Emergency Diesel Generator Room HVAC	S	Train A diesel generator room exhaust damper GMHZ0009 could lose power, failing the damper open which is the desired PFSSD position. Train B diesel generator room exhaust damper is unaffected.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
JE	Diesel Fuel Oil	S	Train A emergency diesel generator day tank low level switch JELSL0001C and day tank level transmitter JELT0001 could be affected. Train B emergency diesel generator day tank components are unaffected.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
KJ	Standby Diesel Engine	S	Train A diesel engine control panel KJ121 could lose power, preventing operation of the Train A diesel generator. Train A and B off-site power and the Train B diesel generator are unaffected by a fire in this area.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
NB	4.16 kV System	S	Train A 125 VDC control power to NB01 could be lost. Train B 125 VDC control power to NB02 is unaffected.
NE	Standby Diesel Generator	S	Train A diesel generator may not be available due to loss of 125 VDC control power to NE107. Offsite power to NB01 and NB02 is unaffected and the Train B diesel generator is unaffected.
NF	Load Shed and Emergency Load Sequencing	S	Train A load shed/emergency load sequencing may be affected due to loss of 125 VDC control power to NF039C. Train B load shed/emergency load sequencing is unaffected.

Table C-16-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-16

System	System Name	PFSSD Function*	Comments
NG	480V Load Centers and MCCs	S	Train A 125 VDC control power to NG01 and NG03 could be lost. Train B 125 VDC control power to NG02 and NG04 is unaffected.
NK	125VDC	S	Train A Class 1E 125 VDC power could be affected. Train B Class 1E 125 VDC power is unaffected.
NN	120VAC	S	Train A Class 1E 120 VAC power could be affected. Train B Class 1E 120 VAC power is unaffected.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
PN	120VAC	S	Non-class 1E 120 VAC switchboard panel PN07 is affected. Non-class 1E 120 VAC switchboard panel PN08 is unaffected.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
QD	Emergency Lighting	S	Control room emergency lighting may be affected. Self-contained battery powered units are available to provide illumination in the control room.
RL	Control Room MCB	S	Train A Class 1E 125 VDC power to the following MCB panels could be affected: RL001/RL002, RL017/RL018, RL019/RL020 and RL021/RL022. This will not affect PFSSD as discussed in Section 5.1.1.
RP	Miscellaneous Control Panels	R, M, H, P, S	Train A 125 VDC power to RP139 and RP209 could be lost. Train A 120 VAC power to RP053AC and RP053DB could be lost. This is acceptable as discussed in Sections 5.1.1 and 5.1.2.
SA	ESFAS	S	Train A MSFIS cabinet SA075A could lose power, causing the MSIVs and MFIVs to fail closed, which is the desired PFSSD position.

Table C-16-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-16			
System	**System Name**	**PFSSD Function***	**Comments**
SB	Reactor Protection System	R, S	Train A reactor trip switchgear cabinet SB102A could lose power. Train B reactor trip switchgear cabinet SB102B is unaffected. 125 VDC power to SB029D could be lost, preventing operation of the Train A reactor protection system. The Train B reactor protection system remains available. Train A 120 VAC power to SB029A, SB029D, SB032A, SB037 and SB038 could be lost. Redundant Train B reactor protection system panels are unaffected.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
SE	Ex-Core Neutron Monitoring	R, P	Source range monitors SENI0031B and SENY0060A/B could lose power. Source range monitors SENI0032B and SENI0061A/B are unaffected.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-16.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in fire area C-16. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post Fire Safe Shutdown is assured if a fire occurs in fire area C-16.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-16.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-16

PFSSD components (S. in E-15000) located in fire area C-16 are shown in Table C-16-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table C-16-3.

Table C-16-3 PFSSD Equipment Located in Fire Area C-16				
Room #	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
3407	NK11 (NORTH)	Train A 125 VDC Class 1E Battery Set	5.1.1	
3407	NK11 (SOUTH)	Train A 125 VDC Class 1E Battery Set	5.1.1	
3408	NK01	Train A Class 1E 125 VDC Bus	5.1.1	
3408	NK0100	125 VDC Class 1E Incoming Line From NK11 Batteries	5.1.1	
3408	NK0101	125 VDC Class 1E Line From/To Battery NK11	5.1.1	
3408	NK0102	125 VDC Class 1E From Transfer Switch NK71	5.1.1	
3408	NK0103	Class 1E 125 VDC to Transfer Switch NK79	5.1.1	
3408	NK0104	125 VDC Class 1E Ctrl/Instr Distr Swbd (NK41)	5.1.1	
3408	NK0105	125 VDC Class 1E Ctrl/Instr Distr Swbd (NK51)	5.1.1	
3408	NK0111	7.5 Kva Inverter (NN11)	5.1.1	
3408	NK21	125 VDC Class 1E Battery Charger	5.1.1	
3408	NK41	125 VDC Class 1E Distribution Switchboard	5.1.1	
3408	NK4100	125 VDC Class 1E Distr Swbd Incoming Feeder	5.1.1	
3408	NK4101	NB01 Breaker Control Power	5.1.1	
3408	NK4108	Diesel Generator Pnl NE107 & Field Flashing	5.1.1	
3408	NK4112	ESF Control Panel (RL017/RL018)	5.1.1	
3408	NK4113	ESF Control Panel (RL019/RL020)	5.1.1	
3408	NK4116	Reactor Trip Switchgear Cabinet (SB102A)	5.1.1	
3408	NK4117	Load Shed/Sequencer Panel Ch 1 & 4 (NF039C)	5.1.1	
3408	NK4118	Solid State Protection Sys Cabinet (SB029D)	5.1.1	
3408	NK4119	RC & Support Sys Control Panel (RL001/RL002)	5.1.1	
3408	NK4122	Auxiliary Relay Rack (RP139)	5.1.1	
3408	NK51	125 VDC Class 1E Distribution Switchboard	5.1.1	

Table C-16-3
PFSSD Equipment Located in Fire Area C-16

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
3408	NK5100	125 VDC Class 1E Distr Swbd Incoming Feeder	5.1.1	
3408	NK5101	NG03 Breaker Control Power	5.1.1	
3408	NK5102	NG01 Breaker Control Power	5.1.1	
3408	NK5108	Pressurizer PORV (BBPCV0455A)	5.1.1	
3408	NK5109	Reactor Auxiliary Control Pnl (RL021/RL022)	5.1.1	
3408	NK5110	ESFAS Cabinet (SA036A)	5.1.1	
3408	NK5111	Diesel Generator Control Panel (KJ121)	5.1.1	
3408	NK5113	Auxiliary Relay Rack (RP209)	5.1.1	
3408	NK5119	MSFIS Cabinet Group 1 (SA075A)	5.1.1	
3408	NK5120	Emergency Lighting Distribution Swbd (NK51A)	5.1.1	
3408	NK51A	Emergency Lighting Distribution Swbd	5.1.1	
3408	NK51A01	Control Room Emergency DC Lighting	5.1.1	
3408	NK71	Battery Chgr NK21/NK25 Xfer Switch (NK01)	5.1.1	
3408	NKHS11	Battery Chgr NK21/NK25 Xfer Switch (NK01) HS	5.1.1	
3408	NKHS251	Bus NK01/NK03 Xfer Switch (NK25) Handswitch	5.1.1	
3408	NN01	120 VAC Class 1E Distribution Switchboard	5.1.2	
3408	NN0101	120 VAC Class 1E Incoming From Inverter NN11	5.1.2	
3408	NN0103	ESFAS Cabinet (SA036A)	5.1.2	
3408	NN0105	Neutron Flux Monitor Signal Amp (SENY60A)	5.1.2	
3408	NN0106	LSELS Panel (NF039B)	5.1.2	
3408	NN0107	NFMS Processor (SENY60B)	5.1.2	
3408	NN0108	LSELS Panel (NF039A)	5.1.2	
3408	NN0109	SSPS Train B Input (SB032A)	5.1.2	
3408	NN0110	SSPS Train A Input (SB029A)	5.1.2	

Table C-16-3
PFSSD Equipment Located in Fire Area C-16

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
3408	NN0111	Process Protection Set 1 Panel (SB038)	5.1.2 5.2.2	
3408	NN0112	SSPS Train A #2 Output (SB029D)	5.1.2	
3408	NN0113	Nuc Instr NIS 1 Panel (SE054A)	5.1.2	
3408	NN0116	BOP Instrumentation Rack (RP053AC)	5.1.2	
3408	NN0120	BOP Instrumentation Rack (RP053AC)	5.1.2	
3408	NN0121	Train A Control Room A/C Unit Inlet & Discharge Dampers (GKHZ0029A & GKHZ0029B)	5.1.2	
3408	NN11	7.5 KVA Inverter	5.1.2	
3408	TB34119	Terminal Box associated with Inverter NN11	5.1.2	
3409	PN07	120 VAC Non-Class 1E Distribution Switchboard	5.1.3	
3409	PN0712	Non-Class 1E 120 VAC Inverter PN09	5.1.3 5.2.4	
3409	PN0736	ESF Control Panel (RL017/RL018)	5.1.3	
3409	PN0738	Reactor Auxiliary Control Pnl (RL021/RL022)	5.1.3 5.2.2	
3409	PN07A	Voltage Regulator Panel - 22.5 KVA	5.1.3	
3409	PN07B	Auto Transfer Switch	5.1.3	
3409	PN07C	PN System Transformer Regulator	5.1.3	
3409	TB34101	TB associated with 120 VAC Bus PN07	5.1.3	
3409	TB34102	TB associated with 120 VAC Bus PN07	5.1.3	
3409	XPN07A	PN System Xfmr, 3 Phase, Delta-Wye Connected	5.1.3	
3409	XPN07D	480/120v Instr Xfmr From PG19G (Alt. Feed)	5.1.3	
3413	NK13 (NORTH)	125 VDC Class 1E Battery	5.1.1	
3413	NK13 (SOUTH)	125 VDC Class 1E Battery	5.1.1	

Table C-16-3
PFSSD Equipment Located in Fire Area C-16

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
3414	NK03	125 VDC Class 1E Bus	5.1.1	
3414	NK0300	125 VDC Class 1E Incoming Line From NK13	5.1.1	
3414	NK0301	125 VDC Class 1E Line From/To Battery NK13	5.1.1	
3414	NK0302	125 VDC Class 1E From Transfer Switch NK73	5.1.1	
3414	NK0303	Class 1E 125 VDC to Transfer Switch NK79	5.1.1	
3414	NK0311	7.5 Kva Inverter (NN13)	5.1.1	
3414	NK23	125 VDC Class 1E Battery Charger	5.1.1	
3414	NK73	Battery Chgr NK23/NK25 Xfer Switch (NK03)	5.1.1	
3414	NKHS13	Battery Chgr NK23/NK25 Xfer Switch (NK03) HS	5.1.1	
3414	NKHS253	Bus NK01/NK03 Xfer Switch (NK25) Handswitch	5.1.1	
3414	NN03	120 VAC Class 1E Distribution Switchboard	5.1.2	
3414	NN0301	120 VAC Class 1E Incoming From Inverter NN13	5.1.2	
3414	NN0303	LSELS Panel (NF039B)	5.1.2	
3414	NN0305	LSELS Panel (NF039A)	5.1.2	
3414	NN0307	BOP Instrumentation Rack (RP053DB)	5.1.2	
3414	NN0309	SSPS Train B Input (SB032A)	5.1.2	
3414	NN0310	SSPS Train A Input (SB029A)	5.1.2	
3414	NN0311	Process Protection Set 3 Panel (SB037)	5.1.2	
3414	NN13	7.5 KVA Inverter	5.1.2	

5.1.1 Class 1E 125 VDC Electrical Distribution System

The PFSSD function of the Class 1E 125 VDC electrical distribution system is to provide a reliable source of DC power to the Class 1E DC loads for control and switching of the Class 1E systems. The DC system is separated into four subsystems, two per load group. Subsystems 1 and 3 (Train A) belong to one load group while subsystems 2 and 4 (Train B) belong to the second load group. The safety actions provided by one load group are independent of the safety actions provided by its redundant counterpart.

The battery chargers for each DC subsystem are energized by Class 1E 480 VAC power, which provides the normal source of power to each bus. Each load group is provided with a swing battery charger that is energized by Class 1E 480 VAC power as well as an alternate source of power from non-Class 1E 480 VAC power. The non-Class 1E 480 VAC power to the swing battery chargers is not modeled in the PFSSD analysis.

A fire in area C-16 could damage multiple cables and components associated with Train A Class 1E 125 VDC electrical distribution system. A number of components and cables that are required to energize Train A Class 1E 125 VDC electrical distribution buses NK01 and NK03 are located in this area. The following table identifies the PFSSD components that will be affected by a loss of Train A Class 1E 125 VDC electrical distribution system as well as the potential impact on PFSSD if power is lost.

Potential Impact on Loss of Train A Class 1E 125 VDC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NKHS0011	125 VDC Bus NK01	This is a transfer switch used to transfer the NK01 power source from battery charger NK21 to swing battery charger NK25. Damage to this switch could prevent battery charger NK21 from energizing NK01. The impact on PFSSD upon loss of this component is discussed in the individual switch discussions below.
NKHS0013	125 VDC Bus NK03	This is a transfer switch used to transfer the NK03 power source from battery charger NK23 to swing battery charger NK25. Damage to this switch could prevent battery charger NK23 from energizing NK03. The impact on PFSSD upon loss of this component is discussed in the individual switch discussions below.
NKHS0251 NKHS0253	125 VDC Buses NK01 and NK03	These are transfer switches used to transfer the swing battery charger to either NK01 or NK03. Damage to this component by itself will not cause a loss of power on either NK01 or NK03 since battery chargers NK21 and NK23 would be available.
NK71	Battery Charger NK21	Damage to this switch could prevent battery charger NK21 from energizing NK01. The impact on PFSSD upon loss of this component is discussed in the individual switch discussions below.

Potential Impact on Loss of Train A Class 1E 125 VDC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NK73	Battery Charger NK23	Damage to this switch could prevent battery charger NK23 from energizing NK01. The impact on PFSSD upon loss of this component is discussed in the individual switch discussions below.
N/A	NK0100	This is the incoming line to NK01 from battery set NK11. The impact on PFSSD upon loss of this component is discussed in the individual switch discussions below.
NK0101	125 VDC Bus NK01	Damage to this component will prevent battery set NK11 from energizing the NK01 bus. Battery chargers NK21 and NK25 could also be affected by a fire in this area, disabling all power to NK01. The impact on PFSSD is discussed in the individual switch discussions below.
NK0102	125 VDC Bus NK01	This switch controls the main power feed to NK01 from battery chargers NK21 and NK25. Battery set NK11 could also be affected by a fire in this area, disabling all power to NK01. The impact on PFSSD is discussed in the individual switch discussions below.
NK0103	Swing Inverter NN15	This switch controls one of two 125 VDC power feeds to swing inverter NN15 through transfer switch NK79. Loss of swing inverter NN15 will not adversely impact PFSSD as discussed in Section 5.1.2.
NK0104	NK41 NK4100	This is on the incoming line to 125 VDC distribution switchboard NK41. Damage to this component will de-energize NK41. The PFSSD switches and components that are affected are discussed below.
NK0105	NK51 NK5100	This is on the incoming line to 125 VDC distribution switchboard NK51. Damage to this component will de-energize NK51. The PFSSD switches and components that are affected are discussed below.
NK0111	Inverter NN11	See Section 5.1.2 for PFSSD impact on loss of Class 1E 120 VAC electrical distribution.
NK4101	NB01 Breaker Control Power	Loss of control power for NB01 breakers will prevent operation of the associated equipment from the control room. Redundant Train B components fed from NB02 are available. Therefore, loss of DC power will not impact PFSSD.

Potential Impact on Loss of Train A Class 1E 125 VDC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NK4108	Diesel Generator Panel NE107	Panel NE107 is the Train A emergency diesel generator control and relay panel. Loss of DC power will prevent operation of the Train A emergency diesel generator. Train A offsite power is available based on XX-E-013, Appendix 2. Therefore, loss of DC power will not impact PFSSD.
NK4112	ESF Control Panel RL017/RL018	The PFSSD components on RL017/RL018 supplied by NK4112 are EMHV8964, EPHIS8808A and EPHIS8808C. Valve EMHV8964 is a test line isolation valve on boron injection and SI flowpaths. Loss of DC power will fail the valve closed which is the desired PFSSD position. Hand switches EPHIS8808A and EPHIS8808C are associated with accumulator injection isolation valves EPHV8808A and EPHV8808C, respectively. Loss of 125 VDC power to the switches will affect position indication but will not affect operation of the valves. Therefore, loss of DC power will not impact PFSSD.
NK4113	ESF Control Panel RL019/RL020	The PFSSD components on RL019/RL020 supplied by NK4113 are solenoid valve EGTV0029 and damper GMHZ0009. Loss of DC power to EGTV0029 will fail the valve closed and prevent temperature control on the Train A CCW heat exchanger. Loss of temperature control will not affect operation of the Train A CCW system for PFSSD. Damper GMHZ0009 is the Train A diesel generator room exhaust damper. Loss of DC power will fail the damper open which is the desired PFSSD position. Therefore, loss of DC power will not impact PFSSD.
NK4116	Reactor Trip Switchgear Cabinet SB102A	SB102A is the Train A reactor trip switchgear cabinet. Loss of power will prevent operation of the Train A reactor trip functions but redundant Train B reactor trip switchgear cabinet SB102B remains available. Therefore, loss of DC power will not impact PFSSD.
NK4117	Channel 1 and 4 Load Shed/Sequencer Panel NF039C	Loss of DC power from NK4117 to NF039C will prevent operation of the Train A load shedder/sequencer. Offsite power is available on Train A based on XX-E-013, Appendix 2. Therefore, loss of DC power will not impact PFSSD.

Potential Impact on Loss of Train A Class 1E 125 VDC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NK4118	Solid State Protection Cabinet SB029D	Loss of DC power to SB029D will prevent operation of the Train A SSPS. Redundant Train B SSPS is available using SB032A through SB032E. Therefore, loss of DC power will not impact PFSSD.
NK4119	RC and Support System Control Panel RL001/RL002	The PFSSD components on RL001/RL002 supplied by NK4119 are solenoid valves BGHV8153A and BGHV8154A on the excess letdown line. Loss of DC power will fail the valves closed which is the desired PFSSD position. Therefore, loss of DC power will not impact PFSSD.
NK4122	Auxiliary Relay Rack RP139	The PFSSD relays located in RP139 that are powered by NK4122 are 1XEF31, 1XEF33 and 1XEF35. These relays are associated with the Train A ESW pump. Loss of DC power could prevent operation of the Train A ESW pump motor but the Train B ESW pump is unaffected by the fire. Therefore, loss of DC power will not impact PFSSD.
NK5101	Load Center NG03 Breaker Control	Loss of control power for NG03 breakers will prevent operation of the associated equipment from the control room. Redundant Train B components fed from NG02 and NG04 are available. Therefore, loss of DC power will not impact PFSSD.
NK5102	Load Center NG01 Breaker Control	Loss of control power for NG01 breakers will prevent operation of the associated equipment from the control room. Redundant Train B components fed from NG02 and NG04 are available. Therefore, loss of DC power will not impact PFSSD.
NK5108	Pressurizer PORV BBPCV0455A	The pressurizer PORV fails closed on loss of DC power which is the desired PFSSD position. Therefore, loss of DC power will not impact PFSSD.
NK5109	Reactor Auxiliary Control Panel RL021/RL022	The PFSSD components on RL021/RL022 supplied by NK5109 are solenoid valves BBHV8001A and BBHV8002A which are reactor head vent valves. Loss of DC power will fail the valves closed which is the desired PFSSD position. Therefore, loss of DC power will not impact PFSSD.
NK5110	ESFAS Cabinet SA036A	SA036A is the Channel I termination cabinet. Loss of DC power will prevent operation of associated Channel I ESFAS signals but will not prevent operation of PFSSD equipment from the control room. Therefore, loss of DC power will not impact PFSSD.

Potential Impact on Loss of Train A Class 1E 125 VDC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NK5111	Diesel Generator Control Panel KJ121	Panel KJ121 is the Train A emergency diesel generator control panel. Loss of DC power will prevent operation of the Train A emergency diesel generator. Train A offsite power is available based on XX-E-013, Appendix 2. Therefore, loss of DC power will not impact PFSSD.
NK5113	Auxiliary Relay Rack RP209	The only PFSSD relay in RP209 supplied by NK5113 is 94XAB5, which is the MSIV bypass valves auxiliary relay. The MSIV bypass valves fail closed on loss of power to the relay which is the desired PFSSD position. Therefore, loss of DC power will not impact PFSSD.
NK5119	Main Steam and Feedwater Isolation Cabinet SA075A	SA075A is the Train A MSFIS cabinet. Loss of DC power to SA075A will cause the MSIVs and MFIVs to close, which is the desired PFSSD position. Therefore, loss of DC power will not impact PFSSD.
NK5120	Control Room Emergency Lighting	Switch NK5120 supplies power to control room emergency lighting distribution switchboard NK51A which energizes switch NK51A01. Loss of control room emergency lights will not affect PFSSD since self-contained battery powered lighting is available. Also see Section 5.2.3.
N/A	NK0300	This is the incoming line to NK03 from battery set NK13. The impact on PFSSD upon loss of this component is discussed in the individual switch discussions below.
NK0301	125 VDC Bus NK03	Damage to this component will prevent battery set NK13 from energizing the NK03 bus. Battery chargers NK23 and NK25 could also be affected by a fire in this area, disabling all power to NK03. The impact on PFSSD is discussed in the individual switch discussions below.
NK0302	125 VDC Bus NK03	This switch controls the main power feed to NK03 from battery chargers NK23 and NK25. Battery set NK13 could also be affected by a fire in this area, disabling all power to NK03. The impact on PFSSD is discussed in the individual switch discussions below.
NK0303	Swing Inverter NN15	This switch controls one of two 125 VDC power feeds to swing inverter NN15 through transfer switch NK79. Loss of swing inverter NN15 will not adversely impact PFSSD as discussed in Section 5.1.2.
NK0311	Inverter NN13	See Section 5.1.2 for PFSSD impact on loss of Class 1E 120 VAC electrical distribution.

Based on the above discussion, a loss of Train A Class 1E 125 VDC power will not adversely impact safe shutdown. In addition, Train B Class 1E 125 VDC power is unaffected by a fire in this area.

References: XX-E-013, E-15000, E-11NK01, E-13AB30, E-13BB30, E-13BB40, E-13EG16, E-13EP02A, E-13GM04, E-13KJ01A, E-13NB13, E-13NE12, E-13NF01, E-13NG11, E-13NK10, E-13NK12, E-13RL01, E-13RL02, E-13RL04, E-13RL05, E-13RL06, E-13RP09, E-13SA21, E-13SB05, E-13SB10, E-K3EF01, E-1F9401A, E-1F9401B, E-1F9402A, E-1F9421, E-1F9422A, E-10NK, E-093-00052, E-093-00053, M-12EP01

5.1.2 Class 1E 120 VAC Electrical Distribution System

The PFSSD function of the Class 1E 120 VAC system is to supply a reliable source of 120 VAC power to vital PFSSD equipment. Four Class 1E 120 VAC distribution switchboards are provided, two per train. The primary power source to each switchboard is from the Class 1E 125 VDC system through an inverter. Each inverter has a backup 480 VAC power supply from the Class 1E 480 VAC system. Two swing inverters, one per safety Train, are installed as a backup to the primary inverter and can be placed in service in the event of a failure or for maintenance of the primary inverter. The swing inverters are powered from the Class 1E 125 VDC system and Class 1E 480 VAC system.

Terminal box TB34119 provides a termination point for the power cable from NG01ACR3 to inverter NN11. The impact on PFSSD due to loss of power to NN11 is discussed in the table below.

A fire in area C-16 can cause a loss of Train A Class 1E 120 VAC switchboards NN01 and NN03. The following table identifies the PFSSD components that will be affected by a loss of Train A Class 1E 120 VAC electrical distribution system as well as the potential impact on PFSSD if power is lost.

Potential Impact on Loss of Train A Class 1E 120 VAC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
N/A	NN11	Damage to 7.5kVA inverter NN11 will prevent the primary power source from energizing NN01. The alternate power source from swing inverter NN15 may also be affected. The PFSSD impact on loss of NN01 is discussed in the individual switch evaluations below.
N/A	NN13	Damage to 7.5kVA inverter NN13 will prevent the primary power source from energizing NN03. The alternate power source from swing inverter NN15 may also be affected. The PFSSD impact on loss of NN03 is discussed in the individual switch evaluations below.
NN0101	120 VAC Switchboard NN01 Power Supply	Damage to this switch will prevent energizing NN01 from both inverter NN11 and swing inverter NN15. The PFSSD impact on loss of NN01 is discussed in the individual switch evaluations below.
NN0301	120 VAC Switchboard NN03 Power Supply	Damage to this switch will prevent energizing NN03 from both inverter NN13 and swing inverter NN15. The PFSSD impact on loss of NN03 is discussed in the individual switch evaluations below.

Potential Impact on Loss of Train A Class 1E 120 VAC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
NN0103	ESFAS Cabinet SA036A	SA036A is the Channel I termination cabinet. Loss of AC power will prevent operation of associated Channel I ESFAS signals but will not prevent operation of PFSSD equipment from the control room. Therefore, loss of AC power will not impact PFSSD.
NN0105 NN0107 NN0113	Neutron Flux Monitor SENY0060A/B NIS1 Panel SE054A	Panel SE054A is associated with source range neutron monitor SENI0031B. Loss of power to the panel will prevent SENI0031B from operating. In addition, power to source range monitor SENY0060A/B could be lost. Source range monitoring remains available using SENI0032B and SENI0061A/B. Therefore, loss of AC power will not impact PFSSD.
NN0106 NN0303	LSELS Panel NF039B	Panel NF039B has four sources of Class 1E 120 VAC power, each from separate 120 VAC distribution switchboards, two on Train A and two on Train B. The LSELS system operates when a degraded voltage condition exists on 2 out of 4 sensors on a single 4,160 volt Class 1E bus. Loss of AC power from NN0106 and NN0303 to NF039B will have no adverse impact on PFSSD since 120 VAC power remains available from NN0204 and NN0405 to NF039B to ensure operation of Train B LSELS. Therefore, loss of AC power will not impact PFSSD.
NN0108 NN0305	LSELS Panel NF039A	Panel NF039A has four sources of Class 1E 120 VAC power, each from separate 120 VAC distribution switchboards, two on Train A and two on Train B. The LSELS system operates when a degraded voltage condition exists on 2 out of 4 sensors on a single 4,160 volt Class 1E bus. Loss of AC power from NN0108 and NN0305 to NF039A will have no adverse impact on PFSSD since 120 VAC power remains available from NN0206 and NN0407 to NF039A to ensure operation of Train A LSELS. Therefore, loss of AC power will not impact PFSSD.
NN0109 NN0310	SSPS Train B Input Panel SB032A	Panel SB032A has four sources of Class 1E 120 VAC input power, one source per channel. NN0109 provides 120 VAC power to channel I and NN0310 provides 120 VAC power to channel III. Loss of two sources of power will render these channels inoperable but the remaining two channels remain operable. The SSPS operates on a 2/3 or 2/4 logic. Therefore, loss of two channels on a train will not prevent the SSPS from

Potential Impact on Loss of Train A Class 1E 120 VAC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
		performing it's function. The loss of power will send a general warning signal for the train and place the SSPS in a partial trip condition. Loss of power on the other train will actuate the SSPS and trip the plant, which is acceptable for PFSSD. Therefore, loss of AC power will not impact PFSSD.
NN0110 NN0309	SSPS Train A Input Panel SB029A	Panel SB029A has four sources of Class 1E 120 VAC input power, one source per channel. NN0110 provides 120 VAC power to channel I and NN0309 provides 120 VAC power to channel III. Loss of two sources of power will render these channels inoperable but the remaining two channels remain operable. The SSPS operates on a 2/3 or 2/4 logic. Therefore, loss of two channels on a train will not prevent the SSPS from performing it's function. The loss of power will send a general warning signal for the train and place the SSPS in a partial trip condition. Loss of power on the other train will actuate the SSPS and trip the plant, which is acceptable for PFSSD. Therefore, loss of AC power will not impact PFSSD.
NN0111 NN0311	Process Protection Set 1 Panel SB038 Process Protection Set 3 Panel SB037	Panel SB038 is the Channel I process protection rack. Panel SB037 is the Channel III process protection rack. Loss of 120 VAC power will prevent operation of Channels I and III inputs to the reactor protection system. The remaining two channels will remain operable. The SSPS operates on a 2/3 or 2/4 logic. Therefore, loss of two channels will not prevent the SSPS from performing it's function. PFSSD transmitters powered from NN0111 are ABPT0514, ABPT0524, ABPT0534, ABPT0544, AELT0501, AELT0529, AELT0539, AELT0551, AELT0554, BBLT0459, BBPT0405, BBPT0455, BBTE0413A, BBTE0423A, BBTE0433B, BBTE0443B, BGFT0215A, BGLT0112, BNLT0930 and GNPT0937. PFSSD transmitters powered from NN0311 are ABPT0526, ABPT0536, AELT0503, AELT0518, AELT0528, AELT0538, AELT0548, BBPT0457, BNLT0932 and GNPT0935. These transmitters and associated control room indicators are not credited in the event of a fire in this area. Redundant instrumentation powered from alternate sources of power is available. Therefore, loss of AC power will not impact PFSSD. Also see Section 5.2.2 for discussion

Potential Impact on Loss of Train A Class 1E 120 VAC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
		on loss of RCS temperature indication.
NN0112	SSPS Train A #2 Output Panel SB029D	Loss of 120 VAC power to SB029D will prevent operation of the Train A SSPS. The Train B output panels are unaffected by a fire in this area. Therefore, loss of AC power will not impact PFSSD.
NN0116 NN0120	BOP Instrument Rack RP053AC	Loss of 120 VAC power from NN0116 to RP053AC will cause a loss of the following PFSSD components: ABPV0001, ALHV0006, ALHV0008, ALHV0009, ALHV0011, ALPT0025, EFFT0053, EFPI0001, JELSL0001C, JELT0001. Loss of power to ABPV0001 will fail the valve closed. The Train B MDAFP can be used to supply steam generator D with temperature control using ABPV0004. The TDAFP can be used to supply steam generators B and C with temperature control using ABPV0002 and ABPV0003. However, as discussed below for switch NN0307, ABPV0003 could fail closed. The remaining components are not credited for a fire in this area so loss of AC power will not adversely impact PFSSD. Loss of 120 VAC power from NN0120 to RP053AC will cause a loss of the following PFSSD components: ALFT0009, ALFT0011, ALPT0037, EFPI0001, EFPT0001, EGPSL0077, EGFT0128, EGPT0077, GDTE0001, GDTSL0001, GDTZ0001A. Loss of power to ALPT0037 will not affect PFSSD due to the availability of ALPT0038 and ALPT0039 to ensure ESFAS LSP swapover. The remaining components are not credited for a fire in this area so loss of AC power will not adversely impact PFSSD.
NN0121	Train A Control Room A/C Unit Inlet & Discharge Dampers GKHZ0029A & GKHZ0029B	Loss of 120 VAC power from NN0121 will impact only Train A inlet & discharge dampers GKHZ0029A & 29B. Train B dampers are unaffected by a fire in this area. Therefore, loss of AC power will not affect PFSSD.
NN0307	BOP Instrument Rack RP053DB	The only PFSSD component affected by a loss of 120 VAC power from NN0307 to RP053DB is steam generator C ARV ABPV0003. A loss of power will cause the ARV to fail closed. As stated above for switches NN0116 and NN0120, steam generator A ARV ABPV0001 could also fail closed. Steam generators B and D ARVs are unaffected by a fire in this area. The Train B MDAFP is available to supply steam generator

Potential Impact on Loss of Train A Class 1E 120 VAC Electrical Distribution System		
Switch(es)	**Component**	**Impact**
		D and the TDAFP is available to supply steam generator B.

The potential PFSSD impacts identified in the above discussion are that steam generators A and C ARVs ABPV0001 and ABPV0003 could fail closed. The Train B motor driven auxiliary feedwater pump (MDAFP) is available to supply steam generator D and the turbine driven auxiliary feedwater pump (TDAFP) is available to supply steam generator B. Therefore, temperature control is achieved using at least two steam generators.

Based on the above discussion, a loss of Class 1E 120 VAC power will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13BG51, E-13EG19, E-13NF01, E-13NN01, E-13RP09, E-13SA21, E-13SB01, E-13SB02, E-13SB05, E-13SB09, E-13SE01, E-13SE07, E-10NF, E-00NN, J-10SA, E-1F9101, E-1F9411A, E-1F9411B, E-1F9421, J-104-00390, J-110-00583, J-110-00584, J-110-00586, J-110-00587, J-110-00588, J-110-00591

5.1.3 Non-Class 1E 120 VAC Electrical Distribution System

The PFSSD function of the non-Class 1E 120 VAC electrical distribution system is to supply 120 VAC power to Main Control Boards (MCBs) RL017/RL018 and RL021/RL022. The power is split at the MCB to supply specific PFSSD components. The other PFSSD function of the non-Class 1E 120 VAC electrical distribution system is to supply power to steam generator feedwater pump controller cabinets FC169A/C and FC170A/C. See Section 5.2.4 for a detailed discussion about the steam generator feedwater pumps.

The PFSSD components that depend on 120 VAC power from RL017/RL018 are Residual Heat Removal (RHR) discharge valves EJHCV0606 (Train A) and EJHCV0607 (Train B). Non-class 1E 120 VAC switchboard panel PN07 supplies power from switch PN0736 to solenoid valve EJHY0606. Solenoid valve EJHY0606 controls the position of EJHCV0606 using hand controller EJHIC0606. Non-class 1E 120 VAC switchboard panel PN08 supplies power from switch PN0833 to solenoid valve EJHY0607. Solenoid valve EJHY0607 controls the position of EJHCV0607 using hand controller EJHIC0607.

The PFSSD components that depend on 120 VAC power from RL021/RL022 are temperature recorders BBTR0423, BBTR0433 and BBTR0443. Non-class 1E switchboard panel PN07 supplies power from switch PN0738 to temperature recorder BBTR0423. Non-class 1E switchboard panel PN08 supplies power from switch PN0835 to temperature recorders BBTR0433 and BBTR0443.

Non-class 1E 120 VAC switchboard panel PN07 and several associated cables and components (PN07A, PN07B, PN07C, TB34101, TB34102, XPN07A and XPN07D) are located in fire area C-16. Therefore, solenoid valve EJHY0606 and temperature recorder BBTR0423 could lose power if a fire occurs in this area. A loss of power to EJHY0606 will fail valve EJHCV0606 open and will prevent control of EJHCV0606 from the control room. Loss of power to temperature recorder BBTR0423 will result in a loss of one of the two RCS loop 2 hot leg temperature indicators.

Non-class 1E 120 VAC power to panel PN08 is unaffected by a fire in this area. Train B RHR valve EJHCV0607 is unaffected by a fire in area C-16, so Train B RHR can be used for

shutdown cooling. For a detailed discussion on PFSSD impact on loss of RCS temperature indication, see Section 5.2.2.

Based on the above discussion, a loss of non-class 1E 120 VAC distribution switchboard PN07 will not adversely impact safe shutdown.

References: XX-E-013, E-15000, E-13PN01A, E-13RL01, E-13RL04, E-13RL06, E-13RP09, E-1F9201, E-1F9205, E-1F9421

5.2 PFSSD CABLE EVALUATION

Table C-16-4 lists all the PFSSD cables (S. in E-15000) located in fire area C-16. The applicable evaluation section is also listed in Table C-16-4.

Table C-16-4
PFSSD Cables Located in Fire Area C-16

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ABK30BB	3408, 3409	SA075A	P	5.1.1	125 VDC to MSFIS Cabinet SA075A from NK5119
11BBK40AL	3408, 3409	BBPCV0455A	P	5.1.1	125 VDC to BBPCV0455A from NK5108
11GKG13AA	3408, 3409	SGK05A	P	5.2.1	Class 1E Elec. Equip. Room A/C Unit A
11GKG13AB	3408, 3409	SGK05A	C	5.2.1	Class 1E Elec. Equip. Room A/C Unit A
11GKG13AH	3408, 3409	SGK05A	C	5.2.1	Class 1E Elec. Equip. Room A/C Unit A
11GKG13AJ	3408, 3409	SGK05A	C	5.2.1	Class 1E Elec. Equip. Room A/C Unit A
11GKY02AF	3408, 3409	GKHZ0029A/B	P	5.2.5	Control Room A/C Unit A Return and Supply Dampers
11KJK01AA	3408, 3409	KJ121	P	5.1.1	125 VDC to KJ121 from NK5111
11NBK13AA	3408, 3409	NB01	P	5.1.1	125 VDC to NB01 from NK4101
11NBK13AB	3408, 3409	NB01	P	5.1.1	125 VDC to NB01 from NK4101
11NEK12AA	3408, 3409	NE107	P	5.1.1	125 VDC to NE107 from NK4108
11NFK01AA	3408, 3409	NF039C	P	5.1.1	125 VDC to NF039C from NK4117
11NFY01AA	3408, 3409	NF039A	P	5.1.2	120 VAC to NF039A from NN0108
11NFY01BA	3408, 3409	NF039B	P	5.1.2	120 VAC to NF039B from NN0106
11NGK11AA	3408, 3409	NG01	P	5.1.1	125 VDC to NG01 from NK5102
11NGK11AB	3408, 3409	NG01	P	5.1.1	125 VDC to NG01 from NK5102
11NGK11BA	3408, 3409	NG03	P	5.1.1	125 VDC to NG03 from NK5101
11NGK11BB	3408, 3409	NG03	P	5.1.1	125 VDC to NG03 from NK5101
11NKG10AA	3408	NK21	P	5.1.1	480 VAC to Battery Charger NK21
11NKG10CA	3414	NK23	P	5.1.1	480 VAC to Battery Charger NK23
11NKK01A1	3408	NK01	P	5.1.1	125 VDC from Swing Battery Charger NK25

Table C-16-4
PFSSD Cables Located in Fire Area C-16

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11NKK01A2	3408	NK01	P	5.1.1	125 VDC from Swing Battery Charger NK25
11NKK01AA	3408	NK41	P	5.1.1	Train A Class 1E 125VDC Switchboard
11NKK01AC	3408	NK51	P	5.1.1	Train A Class 1E 125VDC Switchboard
11NKK01AJ	3407, 3408	NK01	P	5.1.1	Train A Class 1E 125 VDC Bus
11NKK01AM	3408	NK01	P	5.1.1	Train A Class 1E 125 VDC Bus
11NKK01AP	3407, 3408	NK01	P	5.1.1	Train A Class 1E 125 VDC Bus
11NKK01AQ	3408	NK01	P	5.1.1	Train A Class 1E 125 VDC Bus
11NKK01AR	3408	NK41	P	5.1.1	Train A Class 1E 125VDC Switchboard
11NKK01AS	3408	NK51	P	5.1.1	Train A Class 1E 125VDC Switchboard
11NKK01AY	3408	NK01	P	5.1.1	Train A Class 1E 125 VDC Bus
11NKK01AZ	3408	NK01	P	5.1.1	Train A Class 1E 125 VDC Bus
11NKY12AA	3408	NK25	C	5.1.1	Train A Swing Battery Charger
11NKY12AB	3408, 3414	NK25	C	5.1.1	Train A Swing Battery Charger
11NKY12AD	3414	NK25	C	5.1.1	Train A Swing Battery Charger
11NNG01AA	3408, 3409	NN11	P	5.1.2	480 VAC Power to Inverter NN11
11NNG01AB	3408	NN11	P	5.1.2	480 VAC Power to Inverter NN11
11NNG01CA	3408, 3409, 3414	NN13	P	5.1.2	480 VAC Power to Inverter NN13
11NNK01JA	3408, 3409	NN15	P	5.1.1	125 VDC Power to Swing Inverter NN15
11NNK01JB	3408, 3409	NN15	P	5.1.1	125 VDC Power to Swing Inverter NN15
11NNY01AA	3408	NN01	P	5.1.2	120 VAC Power from Inverter NN11
11NNY01AB	3408	NN01	P	5.1.2	120 VAC Power from Inverter NN11
11NNY01AG	3408	NN11	P	5.1.2	125 VDC Power to Inverter NN11
11NNY01AH	3408	NN11	P	5.1.2	125 VDC Power to Inverter NN11

Table C-16-4
PFSSD Cables Located in Fire Area C-16

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11NNY01EA	3408, 3409	NN11	P	5.1.2	120 VAC Power from NN15 to NN11
11NNY01EB	3408, 3409	NN11	P	5.1.2	120 VAC Power from NN15 to NN11
11PNG01AA	3409	XPN07A	P	5.1.3	480 VAC Power from NG01ABF1
11PNG01AD	3409	XPN07A	P	5.1.3	480 VAC Power from NG01ABF1
11QBY03CA	3408, 3409	CR Emerg Lights	C	5.2.3	Control Room Emergency Lights
11QDK01AA	3408, 3409	CR Emerg Lights	P	5.2.3	Control Room Emergency Lights
11RLK01AA	3408, 3409	RL001/RL002	P	5.1.1	125 VDC Power to RL001/RL002 from NK4119
11RLK01CA	3408, 3409	RL017/RL018	P	5.1.1	125 VDC Power to RL017/RL018 from NK4112
11RLK01DA	3408, 3409	RL019/RL020	P	5.1.1	125 VDC Power to RL019/RL020 from NK4113
11RLK01EA	3408, 3409	RL021/RL022	P	5.1.1	125 VDC Power to RL021/RL022 from NK5109
11RPK09AA	3408, 3409	RP139	P	5.1.1	125 VDC Power to RP139 from NK4122
11RPK09CA	3408, 3409	RP209	P	5.1.1	125 VDC Power to RP209 from NK5113
11RPY09CA	3408, 3409	RP053AC	P	5.1.2	120 VAC Power to RP053AC from NN0116
11RPY09DA	3408, 3409	RP053AC	P	5.1.2	120 VAC Power to RP053AC from NN0120
11SAK21AA	3408, 3409	SA036A	P	5.1.1	125 VDC Power to SA036A from NK5110
11SAY21AA	3408, 3409	SA036A	P	5.1.2	120 VAC Power to SA036A from NN0103
11SAZ19KA	3408, 3409	SGK05A	C	5.2.1	Status Panel SA066A Input from SGK05A
11SBS01AD	3408, 3409	SB029A	P	5.1.2	120 VAC Power to SB029A from NN0110
11SBS02AD	3408, 3409	SB032A	P	5.1.2	120 VAC Power to SB032A from NN0109
11SBS05AE	3408, 3409	SB029D	P	5.1.2	120 VAC Power to SB029D from NN0112
11SBS05AF	3408, 3409	SB029D	P	5.1.1	125 VDC Power to SB029D from NK4118
11SBS10AB	3408, 3409	SB102A	P	5.1.1	125 VDC Power to SB102A from NK4116

Table C-16-4
PFSSD Cables Located in Fire Area C-16

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11SBY09CA	3408, 3409	SB038	P	5.1.2 5.2.2	120 VAC Power to SB038 from NN0111
11SES01AA	3408, 3409	SE054A	P	5.1.2	120 VAC Power to SE054A from NN0113
11SES07BA	3408, 3409	SENY0060B	P	5.1.2	120 VAC Power to SENY0060B from NN0107
11SES07CA	3408, 3409	SENY0060A	P	5.1.2	120 VAC Power to SENY0060A from NN0105
13NFY01EA	3414	NF039A	P	5.1.2	120 VAC Power to NF039A from NN0305
13NFY01FA	3414	NF039B	P	5.1.2	120 VAC Power to NF039B from NN0303
13NKK01BG	3413, 3414	NK03	P	5.1.1	Train A Class 1E 125 VDC Bus
13NKK01BH	3413, 3414	NK03	P	5.1.1	Train A Class 1E 125 VDC Bus
13NKK01BK	3414	NK03	P	5.1.1	Train A Class 1E 125 VDC Bus
13NKK01BM	3414	NK03	P	5.1.1	Train A Class 1E 125 VDC Bus
13NKK01BW	3414	NK03	P	5.1.1	Train A Class 1E 125 VDC Bus
13NKK01BX	3414	NK03	P	5.1.1	Train A Class 1E 125 VDC Bus
13NKK01BY	3414	NK03	P	5.1.1	Train A Class 1E 125 VDC Bus
13NKK01BZ	3414	NK03	P	5.1.1	Train A Class 1E 125 VDC Bus
13NNK01KA	3414	NN15	P	5.1.1	125 VDC Power to Swing Inverter NN15
13NNK01KB	3414	NN15	P	5.1.1	125 VDC Power to Swing Inverter NN15
13NNY01BA	3414	NN03	P	5.1.2	120 VAC Power from Inverter NN13
13NNY01BB	3414	NN03	P	5.1.2	120 VAC Power from Inverter NN13
13NNY01BC	3414	NN13	P	5.1.2	125 VDC Power to Inverter NN13
13NNY01BD	3414	NN13	P	5.1.2	125 VDC Power to Inverter NN13
13NNY01FA	3414	NN13	P	5.1.2	120 VAC Pwr to NN13 from Swing Inv NN15
13NNY01FB	3414	NN13	P	5.1.2	120 VAC Pwr to NN13 from Swing Inv NN15

Table C-16-4
PFSSD Cables Located in Fire Area C-16

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
13RPY09AA	3414	RP053DB	P	5.1.2	120 VAC Power to RP053DB from NN0307
13SBS01CD	3414	SB029A	P	5.1.2	120 VAC Power to SB029A from NN0309
13SBS02CD	3414	SB032A	P	5.1.2	120 VAC Power to SB032A from NN0310
13SBY09EA	3414	SB037	P	5.1.2	120 VAC Power to SB037 from NN0311
15FCY35AA	3409	FC169A	P	5.2.4	Steam Generator Feed Pump B Term Cabinet
15GKK31CB	3409	SGK05A	C	5.2.1	Fire Isolation Signal (95XGK07)
15PNY01A1	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01A2	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01A3	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01A4	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01A5	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AA	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AB	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AC	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AH	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AJ	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AK	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AL	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AM	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AN	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AP	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AQ	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AR	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd

Table C-16-4 **PFSSD Cables Located in Fire Area C-16**					
Cable #	**Location**	**Primary PFSSD Equipment**	**Cable Function** (P) Power (C) Control (I) Instrumentation	**Evaluation Section**	**Comments**
15PNY01AS	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AT	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AU	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AV	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AW	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AX	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AY	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15PNY01AZ	3409	PN07	P	5.1.3	120 VAC Non-Class 1E Distribution Swbd
15RLY01DA	3409	RL017/RL018	P	5.1.3	120 VAC Non-Class 1E Power to RL017/RL018 from PN0736
15RLY01EA	3409	RL021/RL022	P	5.1.3 5.2.2	120 VAC Non-Class 1E Power to RL021/RL022 from PN0738
15RPY10AA	3409	PN09	P	5.2.4	Non-Class 1E 120 VAC Inverter

5.2.1 Class 1E Electrical Equipment Room Air Conditioning

Class 1E electrical equipment room air conditioning is required to satisfy the PFSSD support function of maintaining cooling within the Class 1E electrical equipment rooms. Either the Train A or Train B room cooler is required to be operable to ensure adequate room cooling.

Power and control cables associated with Train A Class 1E electrical equipment room A/C unit SGK05A are run in fire area C-16. Damage to these cables could prevent operation of SGK05A. In addition, a fire in this area will initiate the fire detection and Halon actuation system, causing SGK05A to shut down. Damage to cable 15GKK31CB could cause SGK05A to spuriously shut down due to a false fire isolation signal. Therefore, the Train A Class 1E electrical equipment room A/C unit SGK05A is unavailable if a fire occurs in area C-16.

Cable 11SAZ19KA associated with SGK05A is run in fire area C-16. Damage to this cable could prevent operation of SGK05A. Cables associated with SGK05B are unaffected by a fire in area C-16.

Power and control cables associated with Train B Class 1E electrical equipment room A/C unit SGK05B are not run in fire area C-16. Therefore, SGK05B is available in the event of a fire in this area.

Based on the above discussion, the Train B Class 1E electrical equipment room A/C unit SGK05B is available in the event of a fire in area C-16.

References: XX-E-013, E-15000, E-13GK13, E-13GK31, E-13SA19, M-622.1A-00002

5.2.2 RCS Temperature Indication

Reactor coolant system (RCS) hot and cold leg temperature indication is required to verify that RCS decay heat removal has been established, either by forced circulation or natural circulation. The PFSSD methodology requires wide range hot leg and cold leg temperature indication to be available on at least one RCS loop. The following table identifies the hot and cold leg temperature components credited for PFSSD as well as the components power supply.

RCS Loop	Hot Leg Temperature	Power Supply	Cold Leg Temperature	Power Supply
1	BBTE0413A/BBTI0413A	NN0111	BBTE0413B/BBTI0413B	NN0212
2	BBTE0423A/BBTI0423A BBTR0423	NN0111 PN0738	BBTE0423B/BBTI0423B	NN0217
3	BBTE0433A BBTR0433	NN0212 PN0835	BBTE0433B BBTR0433	NN0111 PN0835
4	BBTE0443A BBTR0443	NN0212 PN0835	BBTE0443B BBTR0443	NN0111 PN0835

Class 1E 120 VAC power from NN0111 to process rack SB038 (Cable 11SBY09CA) could be disrupted as discussed in Section 5.1.2. In addition, non-class 1E power from PN0738 to temperature recorder BBTR0423 (Cable 15RLY01EA) could be disrupted as discussed in Section 5.1.3. If this occurs, hot leg temperature indication on loops 1 and 2 will be lost and cold leg temperature indication on loops 3 and 4 will be lost. Hot leg temperature indication on loops 3 and 4 and cold leg temperature indication on loops 1 and 2 remain available.

EMG ES-04 provides alternate indication that may be used. One of these methods verifies that steam generator pressure is stable or decreasing. As stated earlier, the Train B MDAFP is

available to supply steam generators A and D. Steam generator A pressure instruments ABPT515 and ABPT516 and steam generator D pressure instruments ABPT0545 and ABPT0546 are unaffected by a fire in C-16 and can be used per EMG ES-04 to verify heat removal in loops 1 and 4.

The configuration is acceptable because, in the event of a fire in fire area C-16, cooldown will be performed using RCS loops 1 and 4. RCS loop 1 wide range cold leg temperature element BBTE0413B, RCS loop 4 wide range hot leg temperature element BBTE0443A as well as steam generators A and D pressure transmitters ABPT515, ABPT516, ABPT0545 and ABPT0546 will provide indication.

References: E-15000, XX-E-013, E-13RL06, E-13BB15, E-1F9201, E-1F9431, M-12AB01, M-12BB01, EMG ES-04

5.2.3 Control Room Emergency Lights

Emergency lighting is provided in the control room to ensure adequate lighting during a station blackout and in the event a fire damages cables associated with the normal and standby lighting system. Emergency lights are supplied power from Class 1E 125 VDC breaker NK5120.

The control room has four sources of lighting; 1) Normal; 2) Standby; 3) Emergency; and Self-contained battery units. The normal lighting system is not evaluated in the PFSSD analysis and is assumed lost.

The standby lighting system is supplied by the 480 VAC Class 1E electrical system through breakers NG01AHF1 and NG01AHF2. Power availability on NG01AHF1 and NG01AHF2 is monitored by auxiliary relays 27XQB1 and 27XQB2 in panel RP330. Upon loss of power to both NG01AHF1 and NG01AHF2, the relay coils are de-energized and the normally open contacts close. This energizes the contactor control relay which closes a contact and energizes the control room emergency lighting panel NK051A, which automatically illuminates the 125 VDC (QD System) emergency lights in the control room.

Cable 11QBY03CA is a control cable that runs from NK051 to RP330 and provides control power to energize the contactor control relay to illuminate control room emergency lights upon loss of Class 1E power. A short in this cable due to a fire will illuminate emergency lights in the control room even though Class 1E power is available. An open in cable 11QBY03CA will prevent the control room emergency lights from illuminating upon loss of Class 1E power.

Cable 11QDK01AA is a power cable that runs from NK051A to control room emergency lights. Damage to this cable will prevent operation of the emergency lights.

Based on Calculation XX-E-013, Appendix 2, a fire in area C-16 will not result in a loss of offsite power so it is likely that normal lighting in the control room will be available. In the unlikely event control room lighting is lost, self-contained Appendix R battery units are provided in the control room to provide minimum lighting for post-fire safe shutdown. Operations has indicated that installed Appendix R lights are sufficient to perform control room actions to achieve hot standby.

Based on the above discussion, the control room will have sufficient lighting to achieve and maintain PFSSD.

References: E-15000, XX-E-013, E-03NG01, E-093-00064, E-11NK01, E-13NB03, E-13QB03, E-13QD01, E-1L3604, E-1L8900, E-1R3613

5.2.4 Steam Generator Feedwater Pumps

Main feedwater pump steam supply valves FCFV0005 and FCFV0105 are credited in the PFSSD analysis to trip the main feedwater pumps if the main steam isolation valves (MSIVs) are affected by a fire. Closing the MSIVs stops steam flow to the feedwater pumps' turbines and stops the feedwater pumps. The steam generator feedwater pumps are tripped in the event of a fire to prevent overfilling the steam generators.

Non-Class 1E 120 VAC Inverter PN09 and distribution panel PN09A provide power to FCFV0005 trip relays in panel FC169C. Cable 15RPY10AA supplies power from PN0712 to inverter PN09. Cable 15FCY35AA provides the primary source of 120 VAC power from distribution panel PN09A to panel FC169A, which distributes power to the trip relays in panel FC169C. The alternate source of power to panel FC169A is not credited for PFSSD and is assumed lost.

A fire in area C-16 could damage cables 15FCY35AA and 15RPY10AA. If this occurs, operators in the control room would not be able to close valve FCFV0005 to stop steam flow to steam generator feedwater pump PAE01A.

A fire in area C-16 will not affect the ability to close the MSIVs from the control room. All-close hand switches ABHS0079 and ABHS0080 are unaffected and can be used to close the MSIVs from the control room.

Based on the above discussion, valve FCFV0005 may not close if a fire occurs in this area. However, the MSIVs can be closed using either hand switch ABHS0079 or ABHS0080 in the main control room. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-13FC35, E-13RP10, E-1F9103, E-1F9421

5.2.5 Control Room Air Conditioning

Power cables associated with Train A Control Room A/C unit supply and return dampers GKHZ0029A and GKHZ0029B are run in area C-16. Damage to these cables could prevent operation of the associated dampers. Circuits for Train B Control Room A/C unit dampers do not run in area C-16.

Based on the above discussion, Control Room environmental conditions will be unaffected by a fire in area C-16.

References: XX-E-013, E-15000, E-13GK02C, E-1F9421, E-1F9442, M-12GK01

FIRE AREA C-17

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-17 is located on the 2016 elevation of the Control Building and includes the room listed in Table C-17-1.

Table C-17-1
Rooms Located in Fire Area C-17

ROOM #	DESCRIPTION
3418	South Electrical Chase - 2016 Elevation

Fire area C-17 is protected with an automatic wet-pipe sprinkler system and automatic fire detection. The area is separated from adjacent areas by minimum 3-hour fire resistant construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-17-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-17-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-17

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Cables associated with S/G ARV ABPV0004 may be damaged, preventing control of this valve from the control room. The ARV can be isolated by closing air supply valve KAV1429 and nitrogen supply valve KAV1365, then bleeding air from the regulator. The capability to isolate the MSIVs and bypass valves using handswitch ABHS0079 may be affected. The MSIVs and bypass valves can be isolated using handswitch ABHS0080.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-17.
AE	Main Feedwater	H, P	The capability to isolate the MFIVs using handswitch AEHS0081 may be affected. Isolate the MFIVs using handswitch AEHS0080. Steam generator D wide range level indicator AELI0504 in the main control room (MCR) may be affected. Steam generators B and D wide range level indication at the auxiliary shutdown panel (ASP) may be affected. All four narrow range level indicators in the (MCR) are unaffected.
AL	Aux. Feedwater System	H, P	Train B motor driven auxiliary feedwater pump (MDAFP) may be affected. Train A MDAFP is available to supply auxiliary feedwater to SGs B and C. The turbine driven auxiliary feedwater pump will operate, but it may be limited to supplying only steam generators A and D. Steam generator D flow transmitter ALFT0001 may be affected. Steam generator A flow transmitter ALFT0007 may be affected. Steam generators B and C flow transmitters are unaffected. Valves ALHV0005 (MDAFP B to SG D), ALHV0007 (MDAFP B to SG A), ALHV0010 (TDAFP to SG B) and ALHV0012 (TDAFP to SG C) may be affected. Valves from MDAFP A to SGs B and C and from the TDAFP to SGs A and D are unaffected. MDAFP B suction pressure transmitter ALPT0024 may be affected. MDAFP A suction pressure transmitter ALPT0025 is unaffected. TDAFP suction pressure transmitter ALPT0026 is unaffected.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-17.

Table C-17-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-17

System	System Name	PFSSD Function*	Comments
BB	Reactor Coolant System	R, M, H, P, S	Block valve BBHV8000B may fail to respond to a close signal. A cable associated with redundant PORV BBPCV0456A runs in this area but cable damage will not cause the PORV to spuriously open. RCS pressure transmitter BBPT0406 may be affected and pressure indicator BBPI0406 may not function. Pressure transmitter/indicator BBPT0405/BBPI0405 is unaffected. Main control room RCS temperature recorders BBTR0433 and BBTR0443 on loops 3 and 4 could lose power. Loops 2 and 4 RCS temperature indicators BBTI0423X and BBTI0443A, located at the ASP, could be affected. Loop 2 cold leg temperature element BBTE0423B and loop 4 hot leg temperature element BBTE0443A may be affected. Loop 1 cold leg and hot leg temperature indicators BBTI0413B and BBTI0413A in the MCR remain available. Power to reactor head vent valves BBHV8001B and BBHV8002B may be lost. If this occurs, the valves will fail closed which is the desired PFSSD position. Pressurizer level indicator BBLI0460B located at the ASP may be affected. Pressurizer level transmitter BBLT0460 may be affected. Pressurizer level indication in the MCR using BBLI0459A is unaffected. Reactor coolant pumps C and D may not stop using the control room hand switch. RCP seal injection and thermal barrier cooling remain available. Therefore, the inability to stop the RCPs will have no adverse impact on PFSSD.
BG	Chemical and Volume Control System	R, M, S	VCT outlet valve BGLCV0112C may not close in response to a control room signal. Redundant valve BGLCV0112B is unaffected and will close in response to a control room signal or a low-low level in the VCT. Train B centrifugal charging pump (CCP) to RCP seal injection isolation valve BGHV8357B could spuriously close. The Train A RCP seal injection valve BGHV8357A is unaffected. Power to excess letdown isolation valves BGHV8153B and BGHV8154B may be disrupted, causing the valves to fail closed which is the desired PFSSD position. RCP seal injection total flow indicator BGFI0215B may be affected due to loss of 120 VAC power to SB041. Flow indicator BGFI0215A is unaffected.
BM	Steam Generator Blowdown System	R, M, H	Power to steam generator blowdown valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 could be disrupted, causing the valves to fail closed which is the desired PFSSD position.
BN	Borated Refueling Water Storage System	R, M, H	The Train B RWST to CCP suction valve BNLCV0112E may spuriously close. The Train A RWST to CCP suction valve BNLCV0112D is unaffected. RWST to Train B RHR pump valve BNHV8812B may not open, which would prevent a suction source to the Train B RHR pump. RWST to Train A RHR pump valve BNHV8812A is unaffected.
EF	Essential Service Water System	H, S	Train B ESW system may be affected. Train A ESW system is unaffected.

Table C-17-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-17

System	System Name	PFSSD Function*	Comments
EG	Component Cooling Water System	S	Train B CCW pumps PEG01B and PEG01D may be affected. Train A CCW pumps PEG01A and PEG01C are unaffected. Train B CCW temperature control valve EGTV0030 may be affected. Train A CCW temperature control valve EGTV0029 is unaffected. Train B CCW pumps discharge pressure transmitter EGPT0078 and low pressure switch EGPSL0078 may be affected. Train A CCW pumps discharge pressure transmitter EGPT0077 and low pressure switch EGPSL0077 are unaffected. CCW to RCP flow indicator EGFI0129 may be affected due to loss of 120 VAC power to RP053B. Flow indicator EGFI0128 is unaffected.
EJ	Residual Heat Removal System	M, H, P	The Train B RHR system may be affected. Train A RHR is unaffected.
EM	High Pressure Coolant Injection	R, M	The Train B SI pump may spuriously start and may not be able to be stopped from the control room. Actual safety injection will not occur until the RCS pressure decreases below that of the pump shutoff pressure. The pump can be stopped, if necessary, by opening breaker NB0202, but this action is not required for PFSSD. Power to SI test line isolation valves EMHV8843 and EMHV8871 could be affected, causing the valves to fail closed which is the desired PFSSD position.
EN	Containment Spray	R, M	The Train B CS pump may spuriously start. Valve ENHV0012 will remain closed, preventing flow from the CS nozzles. The pump can be stopped, if necessary, by opening breaker NB0203, but this action is not required for PFSSD.
EP	Safety Injection Accumulators	H	Position indication for accumulator injection valves EPHV8808B and EPHV8808D may be affected.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-17.
FC	Auxiliary Turbines	R, H, P	Solenoid valve FCFY0310 associated with Turbine Driven Auxiliary Feedwater Pump steam trap valve FCHV0310 could lose power causing the valve to fail closed which is the desired PFSSD position. Valve FCFV0105 may be affected. The MSIVs can be closed using all-close hand switch ABHS0080.
GD	ESW Pump House HVAC	S	Train B ESW pump room ventilation may be affected. Train A ESW pump room ventilation is unaffected.
GF	AFW Pump Room Coolers	S	Train B motor driven auxiliary feedwater pump room cooler SGF02B may be affected. Train A motor driven auxiliary feedwater pump room cooler SGF02A is unaffected.

Table C-17-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-17

System	System Name	PFSSD Function*	Comments
GK	Control Room and Class 1E Switchgear Room Coolers	S	Train B control room A/C unit SGK04B may be affected. Train A control room A/C unit SGK04A is unaffected. Both Train A and Train B class 1E electrical equipment room A/C units (SGK05A and SGK05B) may be affected. If SGK05A spuriously shuts down or cannot be started, the spurious fire isolation signal can be bypassed by placing hand switch GKHS0101 in bypass position and the unit can be started using GKHIS0100. Hand switches GKHIS0100 and GKHS0101 are located on panel RP068 in the main control room.
GL	Auxiliary Building HVAC	S	Train B CCW pump room cooler SGL11B may be affected. Train A CCW pump room cooler SGL11A is unaffected.
GM	Emergency Diesel Generator Room HVAC	S	Cables associated with Train B diesel generator room exhaust damper GMHZ0019 are run in this area. Train A diesel generator room ventilation is unaffected.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-17.
JE	Diesel Fuel Oil	S	Train B emergency diesel fuel oil transfer pump DPJE01B may be affected. Level indication for the Train B fuel oil storage tank may be lost. Train A emergency diesel fuel oil transfer pump DPJE01A and Train A fuel oil storage tank level transmitter are unaffected.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-17.
KC	Fire Protection	S	Cables associated with Halon protection in class 1E electrical equipment switchboard rooms 3408 and 3414 could be damaged by a fire in area C-17, causing Halon release in these rooms and subsequent shutdown of SGK05A. This will not adversely impact PFSSD (See GK discussion).
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-17.
KJ	Standby Diesel Engine	S	Train B emergency diesel engine may not be available. The Train A emergency diesel engine is unaffected.
MA	Main Generation	S	A cable associated with phase differential relay 287/T1 in transformer protection relay panel MA104F could be affected. This could cause a loss of offsite power to NB01. Cables associated with MA104E are unaffected.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-17.
NB	4.16 kV System	S	A loss of off-site power to NB01 and NB02 may occur. The Train A diesel generator is available to energize the NB01 bus if this occurs.
NE	Standby Diesel Generator	S	Train B emergency diesel generator may not be available. The Train A emergency diesel generator is unaffected.

Table C-17-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-17

System	System Name	PFSSD Function*	Comments
NF	Load Shed and Emergency Load Sequencing	S	Some cables associated with the load shedder/sequencer on both trains could be affected. However, damage to these cables will not prevent the equipment from performing its intended function.
NG	480V Load Centers and MCCs	S	A loss of off-site power to the Train A and B 480 Volt load centers may occur. The Train A diesel generator is available to energize the Train A load centers if this occurs.
NK	125VDC	S	Loss of power to a number of PFSSD components powered from the Train B NK system could occur. These components fail in the desired PFSSD position upon loss of power or the redundant Train A component is available.
NN	120VAC	S	A loss of Train B Class 1E 120 VAC electrical distribution system may occur. The Train A Class 1E electrical distribution switchboards are unaffected.
PA	13.8kV	S	Cables associated with PA0201 phase differential relay 287/T2 could be affected, causing a loss of off-site power to NB02. In addition, the Train B EDG may not be available. The Train A EDG is available to supply power to Train A PFSSD loads. Breaker PA0207 could be affected by a fire in this area. Redundant capability is available.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-17.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-17.
PK	125VDC	S	Battery charger PK22 may be affected. Battery set PK12 will maintain 125 VDC power to PK02. Also, Train A non-class 1E 125 VDC system is unaffected.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-17.
PN	120VAC	S	Power to non-class 1E 120 VAC switchboard PN08 may be affected. Non-class 1E 120 VAC switchboard PN07 is unaffected.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-17.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-17.

Table C-17-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-17

System	System Name	PFSSD Function*	Comments
RL	Control Room MCB	S	Separation group 5 non class 1E 120 VAC power could be disrupted to control room panels RL017/RL018 and RL021/RL022. Separation group 6 non class 1E 120 VAC power remains available.
RP	Miscellaneous Control Panels	R, M, H, P, S	Panel RP140 could lose Class 1E 125 VDC power from NK4415. This affects three relays associated with Train B ESW system. Train A ESW remains available. Panel RP210 could lose Class 1E 125 VDC power from NK4417. This affects the MSIV bypass valves and would cause them to fail closed which is the desired PFSSD position. Panel RP335 could lose Class 1E 125 VDC power from NK4419. This affects control room lockout relays associated with Train B motor driven and turbine driven auxiliary feedwater. Train A motor driven auxiliary feedwater remains available. Train B 120 VAC power to control room panels RP053BA, RP053BB, RP053BC, RP147B and RP068 could be lost. Train A 120 VAC power remains available to supply redundant PFSSD loads.
SA	ESFAS	S	Class 1E 125 VDC and 120 VAC power to panel SA036B could be lost, resulting in a loss of Channel 4 Engineered Safety Features Actuation System (ESFAS). Redundant Channels 1 and 2 ESFAS are unaffected. Class 1E 125 VDC power to Train B MSFIS cabinet SA075B could be affected. Redundant Train A MSFIS cabinet SA075A is unaffected. Status panel input from SGK05B to SA066B could be affected. Status panel input from SGK05A to SA066A is unaffected.
SB	Reactor Protection System	R, S	A loss of power to input channel 4 in SB029A and SB032A could occur. Input channels 1, 2 and 3 remain available. Train B output cabinet 2 and Train B reactor trip switchgear cabinet could lose power. Train A output cabinets and Train A reactor trip switchgear cabinet are unaffected. A number of cables from SB148A and SB148B to the ASP could be affected, causing a loss of process monitoring at the ASP. Process monitoring in the main control room remains available.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-17.
SE	Ex-Core Neutron Monitoring	R, P	SR monitor signal processor SENY0061B and SR monitor amplifier SENY0061A could be affected. Source Range monitoring remains available using SENE0031, SENE0032 and SENY0060A/B
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-17.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-17.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-17. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator Atmospheric Relief Valves

Cables associated with S/G ARV ABPV0004 may be damaged, preventing control of this valve from the control room. The ARV can be isolated by closing air supply valve KAV1429 and nitrogen supply valve KAV1365, then bleeding air from the regulator. The air and nitrogen supply valves are located in fire area A-23 and access is available without having to traverse area C-17.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Main Steam Isolation Valves

A cable associated with hand switch ABHS0079 may be damaged by the fire. Cables for redundant hand switch ABHS0080 are unaffected. Use ABHS0080 in the main control room to close the MSIVs and MSIV bypass valves.

3.2.2 Main Feedwater Isolation Valves

A cable associated with hand switch AEHS0081 may be damaged. Cables for redundant hand switch AEHS0080 are unaffected. Use AEHS0080 in the main control room to close the MFIVs.

3.2.3 Class 1E A/C Unit SGK05A

Class 1E electrical equipment room A/C unit SGK05A may be affected due to damage to cables associated with the fire detection system. If SGK05A spuriously shuts down or cannot be started, the spurious fire isolation signal can be bypassed by placing hand switch GKHS0101 in bypass position and the unit can be started using GKHIS0100. Hand switches GKHIS0100 and GKHS0101 are located on panel RP068 in the main control room.

3.2.4 Component Cooling Water

Train B CCW could be affected by a fire in this area. If this occurs, swap to Train A CCW using normal operating procedures if Train A CCW is not already running. CCW to RCP flow indicator EGFI0128 is available to diagnose a loss of flow to the RCP thermal barriers.

3.2.5 Reactor Coolant Pump Seal Cooling

If Train B CCW is operating at the time of the fire, it could be lost causing a temporary loss of thermal barrier cooling. The normal charging pump is not analyzed and is assumed lost. Operators should swap to Train A CCW to restore thermal barrier cooling and line up the Train A CCP to restore RCP seal injection. RCP seal injection total flow indicator BGFI0215A is

available to diagnose a loss of RCP seal injection. CCW to RCP flow indicator EGFI0128 is available to diagnose a loss of flow to the RCP thermal barriers.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 Residual Heat Removal

Train B RHR may not be available for shutdown cooling. Train A RHR is unaffected.

4.0 CONCLUSION

With some exceptions, redundant Post Fire Safe Shutdown capability exists if a severe fire occurs in area C-17. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-17.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-17

There are no PFSSD components located in area C-17. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-17-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-17. The applicable evaluation section is also listed in Table C-17-3.

Table C-17-3
PFSSD Cables Located in Fire Area C-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ABI20HE	3418	ABPV0004	I	5.2.1	SG D ARV I/P Converter (ABPY0004)
14ABI20HG	3418	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HH	3418	ABPV0004	I	5.2.1	SG D Steamline Pressure (ABPT0004)
14ABI20HJ	3418	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HK	3418	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HL	3418	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HM	3418	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HN	3418	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABK30BB	3418	SA075B	P	5.2.2	125 VDC to MSFIS Cabinet SA075B from NK5423
14AEI08LB	3418	AELT0504	I	5.2.3	SG D Wide Range Water Level
14ALB01B2	3418	DPAL01B	C	5.2.4	Auxiliary Feedwater Pump Motor
14ALB01BG	3418	DPAL01B	C	5.2.4	Auxiliary Feedwater Pump Motor
14ALB01BM	3418	DPAL01B	C	5.2.4	Auxiliary Feedwater Pump Motor
14ALG02AF	3418	ALHV0034	C	5.2.4	Cond Storage Tank To MDAFW Pump B
14ALG02AG	3418	ALHV0034	C	5.2.4	Cond Storage Tank To MDAFW Pump B
14ALG02AH	3418	ALHV0034	C	5.2.4	Cond Storage Tank To MDAFW Pump B
14ALG02AK	3418	ALHV0034	C	5.2.4	Cond Storage Tank To MDAFW Pump B
14ALG04AF	3418	ALHV0030	C	5.2.4	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04AG	3418	ALHV0030	C	5.2.4	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04AH	3418	ALHV0030	C	5.2.4	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04AK	3418	ALHV0030	C	5.2.4	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04DF	3418	ALHV0033	C	5.2.4	Train B ESW to TDAFP

Table C-17-3
PFSSD Cables Located in Fire Area C-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALG04DG	3418	ALHV0033	C	5.2.4	Train B ESW to TDAFP
14ALG04DH	3418	ALHV0033	C	5.2.4	Train B ESW to TDAFP
14ALG04DK	3418	ALHV0033	C	5.2.4	Train B ESW to TDAFP
14ALI03AG	3418	ALHV0005	I	5.2.4	MDAFP B to SG D
14ALI03AH	3418	ALHV0005	I	5.2.4	MDAFP B to SG D
14ALI03AJ	3418	ALHV0005	I	5.2.4	MDAFP B to SG D
14ALI03AK	3418	ALHV0005	I	5.2.4	MDAFP B to SG D
14ALI03AL	3418	ALHV0005	I	5.2.4	MDAFP B to SG D
14ALI03AM	3418	ALHV0005	I	5.2.4	MDAFP B to SG D
14ALI03AP	3418	ALHV0005	I	5.2.4	MDAFP B to SG D
14ALI05AG	3418	ALHV0010	I	5.2.4	TDAFP to SG B
14ALI05AH	3418	ALHV0010	I	5.2.4	TDAFP to SG B
14ALI05AJ	3418	ALHV0010	I	5.2.4	TDAFP to SG B (ALHY0010)
14ALI05AK	3418	ALHV0010	I	5.2.4	TDAFP to SG B
14ALI05AM	3418	ALHV0010	I	5.2.4	TDAFP to SG B
14ALI05AN	3418	ALHV0010	I	5.2.4	TDAFP to SG B
14ALI05AQ	3418	ALHV0010	I	5.2.4	TDAFP to SG B
14ALI07AD	3418	ALFT0001	I	5.2.4	Aux Feedwater to SG D Flow
14ALI07AE	3418	ALFT0001	I	5.2.4	Aux Feedwater to SG D Flow
14ALI07HD	3418	ALPT0024	I	5.2.4	MDAFP B Suction Pressure
14ALI07HE	3418	ALPT0024	I	5.2.4	MDAFP B Suction Pressure
14ALI07HF	3418	ALPT0024	I	5.2.4	MDAFP B Suction Pressure
14ALY09AD	3418	ALHV0005	C	5.2.4	MDAFP B to SG D

Table C-17-3
PFSSD Cables Located in Fire Area C-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BBG39BF	3418	BBHV8000B	C	5.2.5	PZR Power Relief PCV-456A Inlet Isolation
14BBG39BJ	3418	BBHV8000B	C	5.2.5	PZR Power Relief PCV-456A Inlet Isolation
14BBI16BA	3418	BBPT0406	I	5.2.6	RCS Hot Leg Wide Range Pressure
14BBI16BB	3418	BBPT0406	I	5.2.6	RCS Hot Leg Wide Range Pressure
14BBK40BL	3418	BBPCV0456A	P	5.2.5	PZR Power Operated Relief Valve
14BGB01BB	3418	DPBG05B	C	5.2.7	Centrifugal Charging Pump B Motor
14BGG11DC	3418	BGHV8111	C	5.2.7	CCP B Miniflow Valve
14BGG11DD	3418	BGHV8111	C	5.2.7	CCP B Miniflow Valve
14BGG12BA	3418	BGLCV0112C	P	5.2.7	VCT Outlet Valve
14BGG12BB	3418	BGLCV0112C	C	5.2.7	VCT Outlet Valve
14BGG12BC	3418	BGLCV0112C	C	5.2.7	VCT Outlet Valve
14BGG12BE	3418	BGLCV0112C	C	5.2.7	VCT Outlet Valve SI and Low Level Interlock
14BGG52BC	3418	BGHV8357B	C	5.2.7	CCP B to RCP Seal Injection Valve
14BNG01BC	3418	BNLCV0112E	C	5.2.7	Charging Pump B Suction From RWST
14BNG01BD	3418	BNLCV0112E	C	5.2.7	Charging Pump B Suction From RWST
14BNG03BC	3418	BNHV8812B	C	5.2.8	RWST To RHR Pump B Suction
14EFB01SA	3418	DPEF01B	C	5.2.9	Train B ESW Pump Motor
14EFB01SB	3418	DPEF01B	C	5.2.9	Train B ESW Pump Motor
14EFG02CC	3418	EFHV0025	C	5.2.9	Service Water to ESW A Cross Connect Valve
14EFG02CD	3418	EFHV0025	C	5.2.9	Service Water to ESW A Cross Connect Valve
14EFG02CE	3418	EFHV0025	C	5.2.9	Service Water to ESW A Cross Connect Valve
14EFG02CF	3418	EFHV0025	C	5.2.9	Service Water to ESW A Cross Connect Valve
14EFG02DC	3418	EFHV0026	C	5.2.9	Service Water to ESW B Cross Connect Valve

Table C-17-3
PFSSD Cables Located in Fire Area C-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EFG02DD	3418	EFHV0026	C	5.2.9	Service Water to ESW B Cross Connect Valve
14EFG02DE	3418	EFHV0026	C	5.2.9	Service Water to ESW B Cross Connect Valve
14EFG02DF	3418	EFHV0026	C	5.2.9	Service Water to ESW B Cross Connect Valve
14EFG03AC	3418	EFHV0039	C	5.2.9	ESW A to Service Water System
14EFG03AD	3418	EFHV0039	C	5.2.9	ESW A to Service Water System
14EFG03AE	3418	EFHV0039	C	5.2.9	ESW A to Service Water System
14EFG03BC	3418	EFHV0040	C	5.2.9	ESW B to Service Water System
14EFG03BD	3418	EFHV0040	C	5.2.9	ESW B to Service Water System
14EFG03BE	3418	EFHV0040	C	5.2.9	ESW B to Service Water System
14EFG06BC	3418	EFHV0038	C	5.2.9	ESW B to Ultimate Heat Sink
14EFI08RB	3418	EFPT0002	I	5.2.9	ESW Pump 1B Discharge Pressure
14EFI11FA	3418	EFFT0054	I	5.2.9	ESW B Flow Transmitter
14EGB01BB	3418	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BC	3418	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BD	3418	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BG	3418	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BK	3418	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01DB	3418	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGB01DC	3418	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGB01DD	3418	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGB01DG	3418	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGG05DD	3418	EGHV0054	C	5.2.10	Train B CCW to the Service Loop
14EJB01BB	3418	DPEJ01B	C	5.2.8	RHR Pump B Motor

Table C-17-3
PFSSD Cables Located in Fire Area C-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EJG04BC	3418	EJHV8804B	C	5.2.8	RHR B Supply to SI Pump B Iso Valve
14EJG08BC	3418	EJFCV0611	C	5.2.8	RHR Pump B Miniflow Valve
14EMB01BB	3418	DPEM01B	C	5.2.11	SI Pump B Motor
14ENB01BB	3418	DPEN01B	C	5.2.12	Containment Spray Pump B Motor
14GDG01BF	3418	DCGD01B	C	5.2.9	ESW Pump Room Supply Fan B Motor (GDHS0011)
14GDG01BH	3418	DCGD01B	C	5.2.9	ESW Pump Room Supply Fan B Motor (GDHS0011)
14GDY01BA	3418	CGD01B	C	5.2.9	ESW Pump Room B Supply Fan
14GDY01BB	3418	CGD01B	C	5.2.9	ESW Pump Room B Supply Fan
14GDY01BD	3418	CGD01B	C	5.2.9	ESW Pump Room B Supply Fan
14GFG01BC	3418	DSGF02B	C	5.2.4	AFW Pump B Room Cooler Motor
14GKG02BA	3418	SGK04B	P	5.2.13	Control Room A/C Unit B
14GKG13BA	3418	SGK05B	P	5.2.14	Class 1E Elec. Equip. Room A/C Unit B
14GKG13BG	3418	SGK05B	C	5.2.14	Class 1E Elec. Equip. Room A/C Unit B
14GKG13BH	3418	SGK05B	C	5.2.14	Class 1E Elec. Equip. Room A/C Unit B
14GKG13BK	3418	SGK05B	C	5.2.14	Class 1E Elec. Equip. Room A/C Unit B (GKHS0103)
14GKG13BM	3418	SGK05B	C	5.2.14	Class 1E Elec. Equip. Room A/C Unit B (GKHS0103)
14GKY02BA	3418	GKHZ0040A/B	C	5.2.13	Control Room A/C Unit 4B Supply/Discharge Dampers
14GKY02BB	3418	GKHZ0040B	C	5.2.13	Control Room A/C Unit 4B Discharge Damper
14GKY02BC	3418	GKHZ0040A	C	5.2.13	Control Room A/C Unit 4B Supply Damper

Table C-17-3
PFSSD Cables Located in Fire Area C-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GKY02BD	3418	GKHZ0040A/B	C	5.2.13	Control Room A/C Unit 4B Supply/Discharge Dampers
14GKY02BE	3418	GKHZ0040A/B	P	5.2.13	Control Room A/C Unit 4B Supply/Discharge Dampers
14GKY02BF	3418	GKHZ0040A/B	P	5.2.13	Control Room A/C Unit 4B Supply/Discharge Dampers
14GLG06BD	3418	DSGL11B	C	5.2.10	CCW Pump B Room Cooling Fan Motor
14GMG01BH	3418	GMHS0011B	C	5.2.15	Train B Diesel Generator Room Supply Fan Isolation Switch
14GMK04BA	3418	GMHZ0019	C	5.2.15	Train B DG Room Exhaust Damper
14GMK04BB	3418	GMHZ0019	C	5.2.15	Train B DG Room Exhaust Damper
14GMK04BE	3418	GMHZ0019	C	5.2.15	Train B DG Room Exhaust Damper (GMHS019B)
14JEG01BB	3418	DPJE01B	C	5.2.15	Emergency Fuel Oil Transfer Pump B Motor
14JEG01BD	3418	DPJE01B	C	5.2.15	Emergency Fuel Oil Transfer Pump B Motor
14JEG01BE	3418	DPJE01B	C	5.2.15	Emergency Fuel Oil Transfer Pump B Motor
14JEI04BA	3418	JELT0021	I	5.2.15	Emergency Fuel Oil Day Tank B Level
14KJK03AA	3418	KKJ01B	P	5.2.15	Train B Emergency Diesel Engine
14KJK03AH	3418	KKJ01B	C	5.2.15	Train B Emergency Diesel Engine
14KJK03AJ	3418	KJ122	C	5.2.15	Train B Diesel Generator Control Panel
14KJK03AK	3418	KKJ01B	C	5.2.15	Train B Emergency Diesel Engine
14KJK07AE	3418	NE106	I	5.2.15	Train B D/G Control Panel
14NBB04AB	3418	NBHS0011	C	5.2.16	NB02 Synchro-scope/Selector Switch
14NBB04AD	3418	NBHS0011	C	5.2.16	NB02 Synchro-scope/Selector Switch
14NBB04AE	3418	NBHS0011	C	5.2.16	NB02 Synchro-scope/Selector Switch

Table C-17-3
PFSSD Cables Located in Fire Area C-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NBB04AF	3418	NBHS0011	C	5.2.16	NB02 Synchro-scope/Selector Switch
14NBB05AC	3418	NBHS0008	C	5.2.16	XNB02 to NB0209 Synch Transfer Switch
14NBB06AC	3418	NBHS0009	C	5.2.16	XNB01 to NB0212 Synch Transfer Switch
14NBB14AA	3418	NB00209	C	5.2.16	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AB	3418	NB00209	C	5.2.16	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AC	3418	NB00209	C	5.2.16	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AD	3418	NB00209	C	5.2.16	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AE	3418	NB00209	C	5.2.16	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AF	3418	NB00209	C	5.2.16	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AG	3418	NB00209	C	5.2.16	Bus NB02 Feeder Breaker NB0209 Control
14NBB15AA	3418	NB00212	C	5.2.16	Bus NB02 Feeder Breaker NB0212 Control
14NBB15AC	3418	NB00212	C	5.2.16	Bus NB02 Feeder Breaker NB0212 Control
14NBK15AA	3418	NB002	P	5.2.16	NB02 DC Breaker Control Power
14NBK15AB	3418	NB002	P	5.2.16	NB02 DC Breaker Control Power
14NEB02AL	3418	NE106	C	5.2.15	Train B D/G Control Panel
14NEB11AA	3418	NB00211	C	5.2.15	Train B D/G Feeder Breaker NB0211 Control
14NEB11AD	3418	NB00211	C	5.2.15	Train B D/G Feeder Breaker NB0211 Control
14NEK13AA	3418	NE106	P	5.2.15	Train B D/G Exciter Control Power
14NEK13AD	3418	NE106	C	5.2.15	Train B D/G Control Panel
14NEK13AJ	3418	NE106	I	5.2.15	Train B D/G Control Panel
14NFK01AA	3418	NF039C	P	5.2.17	DC Power to Load Shed/Seq Pnl Ch 1 & 4 Terms
14NFK01CA	3418	NF039A	C	5.2.17	Load Shed Ch 1 Logic (UV Relay)

Table C-17-3
PFSSD Cables Located in Fire Area C-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NFK01DA	3418	NF039B	C	5.2.17	Load Shed Ch 4 Logic (UV Relay)
14NFY01EA	3418	NF039A	C	5.2.17	Load Shed Ch 1 Logic (PT Input)
14NFY01FA	3418	NF039B	C	5.2.17	Load Shed Ch 4 Logic (PT Input)
14NFY01GA	3418	NF039A	P	5.2.17	AC Power to Load Shed/Seq Ch 1 Logic
14NFY01HA	3418	NF039B	P	5.2.17	AC Power to Load Shed/Seq Ch 4 Logic
14NGB10AB	3418	NB00213	C	5.2.18	Breaker NB0213 to XNG02 Control
14NGB10BB	3418	NB00210	C	5.2.18	Breaker NB0210 to XNG04 Control
14NGB10SA	3418	NB00216	C	5.2.18	Breaker NB0216 to XNG06 Control
14NGG01AD	3418	NG002B	P	5.2.18	Breaker NG0207 to NG02BAF1
14NGG01AE	3418	NG002B	P	5.2.18	Breaker NG0207 to NG02BAF1
14NGG01AJ	3418	DSGN01B	P	5.2.18	Containment Cooler Pump B Motor
14NGG01BB	3418	NG004C	P	5.2.18	Breaker NG0406 to NG04CMF1
14NGG01BC	3418	NG004C	P	5.2.18	Breaker NG0406 to NG04CMF1
14NGG01BF	3418	NG004T	P	5.2.18	Breaker NG0405 to NG04TAF1
14NGG11AA	3418	NG00201	C	5.2.18	Breaker NG0201 Control
14NGG11BA	3418	NG00401	C	5.2.18	Breaker NG0401 Control
14NGK11AA	3418	NG00201	P	5.2.18	Bus NG02 DC Breaker Control Power
14NGK11AB	3418	NG00201	P	5.2.18	Bus NG02 DC Breaker Control Power
14NGK11BA	3418	NG00401	P	5.2.18	Bus NG04 DC Breaker Control Power
14NGK11BB	3418	NG00401	P	5.2.18	Bus NG04 DC Breaker Control Power
14NNG01AA	3418	NN14	P	5.2.19	480 VAC Power to Inverter NN14
14NNG01BA	3418	NN12	P	5.2.19	480 VAC Power to Inverter NN12
14NNK01MA	3418	NN16	P	5.2.19	125 VDC Power to Swing Inverter NN16

Table C-17-3
PFSSD Cables Located in Fire Area C-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NNK01MB	3418	NN16	P	5.2.19	125 VDC Power to Swing Inverter NN16
14NNY01HA	3418	NN14	P	5.2.19	120 VAC Pwr to NN14 from Swing Inv NN16
14NNY01HB	3418	NN14	P	5.2.19	120 VAC Pwr to NN14 from Swing Inv NN16
14PKK11AA	3418	PK022	C	5.2.18	NG0409 Breaker Control
14PNG01AD	3418	PN008	P	5.2.20	Non-Class 1E Electrical Equipment AC Distribution Panel
14PNG01AE	3418	PN008	P	5.2.20	Non-Class 1E Electrical Equipment AC Distribution Panel
14RLK01AA	3418	NK04407	P	5.2.21	125 VDC to RC & Support Sys Control Panel (RL001/RL002)
14RLK01BA	3418	NK04409	P	5.2.21	125 VDC to Turbine Gen & Fdwtr Ctrl Pnl (RL005/RL006)
14RLK01CA	3418	NK04412	P	5.2.21	125 VDC to ESF Control Panel (RL017/RL018)
14RLK01DA	3418	NK04413	P	5.2.21	125 VDC to ESF Control Panel (RL019/RL020)
14RLK01EA	3418	NK04414	P	5.2.21	125 VDC to Reactor Auxiliary Control Pnl (RL021/RL022)
14RLK01FA	3418	NK04411	P	5.2.21	125 VDC to Turbine Gen & Fdwtr Ctrl Pnl (RL023/RL024)
14RPK09AA	3418	NK04417	P	5.2.22	125 VDC to Auxiliary Relay Rack RP210
14RPK09BA	3418	NK04415	P	5.2.9	125 VDC to Auxiliary Relay Rack RP140
14RPK09NA	3418	NK04419	P	5.2.23	125 VDC to Auxiliary Relay Rack RP335
14RPK15BA	3418	86XRP5	C	5.2.23	Control room lockout relay (RP335)
14RPK15CA	3418	86XRP6	C	5.2.23	Control room lockout relay (RP335)
14RPK15DA	3418	86XRP7	C	5.2.23	Control room lockout relay (RP335)
14RPY09BA	3418	RP053BC	P	5.2.24	120 VAC Power to RP053BC from NN0416

Table C-17-3
PFSSD Cables Located in Fire Area C-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14RPY09CA	3418	RP053BC	P	5.2.24	120 VAC Power to RP053BC from NN0418
14RPY09GA	3418	RP147B	P	5.2.24	120 VAC Power to RP147B from NN0404
14RPY10BA	3418	RP068	P	5.2.24	120 VAC Power to RP068 from NG02ACR136
14SAK21BA	3418	SA036B	P	5.2.25	125 VDC Power to SA036B from NK5409
14SAY21BA	3418	SA036B	P	5.2.25	120 VAC Power to SA036B from NN0403
14SAZ20HA	3418	SGK05B	C	5.2.14	Status Panel SA066B Input from SGK05B
14SBS01DC	3418	SB029A	P	5.2.26	120 VAC Power to SB029A from NN0409
14SBS02DC	3418	SB032A	P	5.2.26	120 VAC Power to SB032A from NN0410
14SBS05BE	3418	SB032D	P	5.2.26	120 VAC Power to SB032D from NN0412
14SBS05BF	3418	SB032D	P	5.2.26	125 VDC Power to SB032D from NK4416
14SBS10BB	3418	SB102B	P	5.2.26	125 VDC Power to SB102B from NK5410
14SBS16AA	3418	BBTI0423X	I	5.2.27	RCS Cold Leg Loop 2 Temp Ind (WR) at RP118B
14SBS16BA	3418	AELI0504A	I	5.2.27	SG D Wide Range Level Indicator at RP118B
14SBS16EA	3418	BBTI0443A	I	5.2.27	RCS Hot Leg Loop 4 Temp Ind (WR) at RP118B
14SBS16NA	3418	BBPI0406X	I	5.2.27	RCS Wide Range Pressure Ind at RP118B
14SBS16XA	3418	AELI0502A	I	5.2.27	SG B Wide Range Level Indicator at RP118B
14SBS16YA	3418	AELI0504A	I	5.2.27	SG D Wide Range Level Indicator at RP118B
14SBS16ZA	3418	BBLI0460B	I	5.2.27	Pressurizer Level Indicator (NR) at RP118B
14SBY09FA	3418	SB041	P	5.2.26	120 VAC to Panel SB041 from NN0414
14SBY09HA	3418	SB148B	P	5.2.29	120 VAC to Panel SB148B from NN0420
14SES07BA	3418	SENY0061B	P	5.2.28	Source Range Monitoring

Table C-17-3
PFSSD Cables Located in Fire Area C-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14SES07CA	3418	SENY0061A	P	5.2.28	Source Range Monitoring
16BBA01CC	3418	DPBB01C	C	5.2.30	Reactor Coolant Pump C Motor
16BBA01DC	3418	DPBB01D	C	5.2.30	Reactor Coolant Pump D Motor
16FCY35AA	3418	FC170A	P	5.2.31	Steam Generator Feed Pump B Term Cabinet
16GKK31DB	3418	SGK05B	C	5.2.14	Fire Isolation Signal (95XGK08)
16KCQ21EA	3418	SGK05B	C	5.2.14	Fire Detection Actuation Circuit
16KCQ21FA	3418	SGK05A	C	5.2.14	Fire Detection Actuation Circuit
16KCQ21HA	3418	SGK05B	C	5.2.14	Fire Detection Actuation Circuit
16KCQ21JA	3418	SGK05A	C	5.2.14	Fire Detection Actuation Circuit
16NBA10AB	3418	XNB01	C	5.2.16	NB0212 Lockout Relay 286-2/T1 (MA104F)
16NBA11AC	3418	XNB02	C	5.2.16	NB0209 Lockout Relay 286-1/T2 (PA0201)
16NBA11AE	3418	XNB02	C	5.2.16	NB0209 Lockout Relay 286-2/T2 (PA0201)
16NBB03AB	3418	XNB01	P	5.2.16	XNB01 Phase Differential Relay 287/T1 (MA0104F)
16NBB05AD	3418	XNB02	P	5.2.16	XNB02 Phase Differential Relay 287/T2 (PA0201)
16NBB05AL	3418	XNB02	P	5.2.16	XNB02 Phase Differential Relay 287/T2 (PA0201)
16PGA11AC	3418	PA0207	C	5.2.32	Load Centers PG14, PG18, PG20 and PG24 Fdr Bkr
16PNY01AR	3418	XPN08D	P	5.2.20	Alternate feed to PN08 from PG20GER5
16PNY01AW	3418	PN008A	P	5.2.20	Voltage Regulator Panel 22.5 KVA
16PNY01AX	3418	PN008A	P	5.2.20	Voltage Regulator Panel 22.5 KVA
16PNY01AY	3418	PN008A	P	5.2.20	Voltage Regulator Panel 22.5 KVA

Table C-17-3
PFSSD Cables Located in Fire Area C-17

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16PNY01AZ	3418	PN008A	P	5.2.20	Voltage Regulator Panel 22.5 KVA
16RLY01DA	3418	PN00833	P	5.2.20	120 VAC to ESF Control Pnl (RL017/RL018)
16RLY01EA	3418	PN00835	P	5.2.20	120 VAC to Rx Aux Control Pnl (RL021/RL022)
16RPY10AA	3418	PN10	P	5.2.31	Non-Class 1E 120 VAC Inverter

5.2.1 Steam Generator Atmospheric Relief Valves

PFSSD requires at least two steam generator atmospheric relief valves (ARV) be controlled and the other two closed. The ARVs are pneumatically operated using air from the compressed air system (KA) or nitrogen from the nitrogen accumulators. The valves open by pneumatic pressure and close by spring action. A pressure transmitter installed on the outlet side of the steam generator sends a signal to a controller and automatically controls the associated ARV position. Alternatively, each ARV can be controlled manually from the control room or the auxiliary shutdown panel by placing the pressure indicating controller (PIC) in manual.

Cables associated with steam generator D ARV ABPV0004 are run in area C-17. Damage to these cables could prevent control or closure of the ARV. Cables associated with the remaining ARVs are run in a different fire area.

If steam generator D ARV ABPV0004 spuriously opens, operators can isolate air and nitrogen to fail the ARV closed. Air is isolated by closing valve KAV1429 and nitrogen is isolated by closing valve KAV1365. The air and nitrogen supply valves are located in fire area A-23 and access is available without having to traverse area C-17.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB20B, E-1F9101, M-12AB01, M-12KA04, M-12KA05

5.2.2 Main Steam and Feedwater Isolation Actuation Cabinet

The Class 1E 125 VDC power supply cable to Train B MSFIS Cabinet SA075B is run in area C-17. Damage to this cable could prevent closure of the MSIVs and MFIVs using handswitches ABHS0079 and AEHS0081, respectively.

The Class 1E 125 VDC power supply cable to redundant Train A MSFIS cabinet SA075A is not run in area C-17. Therefore, the MSIVs and MFIVs can be closed using handswitches ABHS0080 and AEHS0080, respectively.

References: E-15000, XX-E-013, E-13AB26, E-13AB27, E-13AB30, E-13AE14, E-13AE15, E-1F9101, E-1F9201, M-12AB02, M-12AE02

5.2.3 Steam Generator Level Indication

An instrument cable associated with steam generator D wide range level transmitter AELT0504 is run in this area. Damage to this cable could prevent wide range indication of steam generator D level in the control room. However, cables associated with all four steam generator D narrow range level transmitters are run in a different fire area and are unaffected by a fire in C-17. Therefore, level indication on the D steam generator is available.

References: E-15000, XX-E-013, E-1F9203, E-13AE08, M-12AE02

5.2.4 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

Cables associated with Train B auxiliary feedwater pump are run in area C-17. Damage to these cables could prevent operation of the pump. The Train A motor driven auxiliary feedwater pump (MDAFP) and the turbine driven auxiliary feedwater pump (TDAFP) remain available to ensure auxiliary feedwater.

The suction isolation valve from the condensate storage tank (CST) to the Train B MDAFP (ALHV0034) may be affected such that the valve spuriously closes. Therefore, the CST may not be able to provide a suction source to the Train B MDAFP. In addition, the essential service water (ESW) source to Train B MDAFP may be affected due to damage to cables associated with ALHV0030. The CST and ESW supply to the Train A MDAFP are unaffected. Also, the CST supply to the TDAFP and the Train A ESW supply to the TDAFP are available. The Train B ESW supply valve to the TDAFP (ALHV0033) may not be available.

The Train B MDAFP to steam generator (SG) D control valve (ALHV0005) may spuriously close or may not operate properly. The TDAFP is available to supply SG D through valve ALHV0006, which is unaffected by a fire in area C-17.

Valve ALHV0010 could be affected such that the valve cannot be controlled from the control room or the valve may spuriously close. This valve controls auxiliary feedwater flow from the TDAFP to SG B. Valve ALHV0009 is unaffected by a fire in area C-17 and is available to ensure an adequate auxiliary feedwater supply from the Train A MDAFP to SG B.

As discussed in Section 5.2.24, the TDAFP to SG C control valve (ALHV0012) may be affected. Therefore, this valve cannot be relied on to ensure a supply of AFW from the TDAFP to SG C.

Auxiliary feedwater to SG D flow transmitter ALFT0001 may be affected. Auxiliary feedwater to SG A flow transmitter ALFT0007 may be affected (See Section 5.2.24). Auxiliary feedwater to SG A flow transmitter ALFT0002 is unaffected. Flow transmitters on SGs B and C supply lines are unaffected.

Train B MDAFP suction pressure transmitter (ALPT0024) may be affected. Suction pressure transmitters on Train A MDAFP and TDAFP suction lines are unaffected.

A cable associated with the Train B MDAFP room cooler (SGF02B) is run in this area. Damage to this cable could prevent operation of the cooler. The Train A MDAFP room cooler (SGF02A) is unaffected.

In summary, the Train A MDAFP is available to supply auxiliary feedwater to SGs B and C using either the CST or the ESW as the supply. In addition, the TDAFP is available to supply auxiliary feedwater to steam generators A and D using either the CST or the ESW as the supply, however the flow transmitter for SG D may not be available.

References: E-15000, XX-E-013, E-13AL01B, E-13AL02B, E-13AL03B, E-13AL04B, E-13AL05B, E-13AL07B, E-13AL09, E-13GF01, E-1F9202, E-1F9203, E-1F9204, E-1F9444, M-12AL01, M-12GF01

5.2.5 Pressurizer Power Operated Relief Valves and Associated Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed. Cables associated with PORV BBPCV0456A and associated block valve BBHV8000B are located in area C-17. Cables associated with BBPCV0455A and BBHV8000A are run in a different fire area.

A fire in area C-17 could damage cables for block valve BBHV8000B such that the block valve fails to respond to a close signal. Only one cable associated with PORV BBPCV0456A runs in area C-17. This cable (14BBK40BL) provides 125 VDC power from NK4421 to the control

circuit for the valve. Damage to this cable could disrupt power to the PORV and prevent it from opening but will not cause the PORV to spuriously open. Power failure will fail the valve closed, which is the desired PFSSD position.

Based on the above discussion, both pressurizer relief flow paths will remain isolated in the event of a fire in area C-17.

References: E-15000, XX-E-013, E-13BB39, E-13BB40, E-1F9301, M-12BB02

5.2.6 Reactor Coolant System (RCS) Pressure Indication

PFSSD requires RCS pressure indication to be available. RCS pressure indication is provided in the control room using BBPI0405 or BBPI0406. Cables for BBPT0406 run through fire area C-17. Therefore, pressure indicator BBPI0406 may not function.

Cables for BBPT0405 are run in a separate fire area and are unaffected by a fire in area C-17. Therefore, RCS pressure indication will be available using BBPI0405 if a fire occurs in area C-17.

References: E-15000, XX-E-013, E-13BB15, E-13BB16, E-1F9201, E-1F9205, M-12BB04

5.2.7 Centrifugal Charging System

At least one centrifugal charging pump (CCP) is required for PFSSD to provide RCP seal cooling, reactivity control and inventory control. These functions are accomplished using a CCP taking suction from the refuelling water storage tank (RWST) and injecting through the RCP seals. RCP seal injection provides approximately 20 gpm makeup to the RCS and provides adequate boron concentration to maintain sub-critical reactivity conditions. If RCP seal injection is unavailable, reactivity and inventory control is provided by lining up the CCPs to the boron injection tank (BIT). The normal charging pump (NCP) is not credited and is assumed lost.

Cables associated with Train B charging system are run in area C-17. Damage to these cables could prevent operation of the system. The Train A charging system is unaffected by the fire.

Volume control tank (VCT) outlet valve BGLCV0112C may not close in response to a control room signal. Redundant valve BGLCV0112B is unaffected and will close using the handswitch (BGHIS0112B) in the control room or in response to a low-low level in the VCT.

Cable 14BGG12BE provides the permissive for valve BGLCV0112C to close when either a SIS or a VCT low-low level is received. A hot short in this cable would bypass the SIS and VCT low-low level contacts. However, the valve will not spuriously close because cable 14BGG12BD is unaffected by the fire. This cable provides the permissive to complete the circuit and close BGLCV0112C when RWST to charging pump valve BNLCV0112E is fully open. Therefore BGLCV0112C will not spuriously close, unless the RWST is aligned to the charging header, in which case a loss of suction to charging will not occur.

Train B centrifugal charging pump (CCP) to RCP seal injection isolation valve BGHV8357B could be affected by a fire in this area. The Train A RCP seal injection valve BGHV8357A is unaffected by the fire. Therefore, seal injection can be accomplished using Train A charging system.

Cables associated with RWST to Train B CCP valve BNLCV0112E run in this area. Damage to these cables could prevent opening the valve, which would prevent a suction source to the CCP. Cables associated with RWST to Train A CCP valve BNLCV0112D do not run in this area. Therefore, the RWST is available to provide a suction source to the Train A CCP.

Based on the above discussion, the Train B CCP may not be available but the Train A CCP is unaffected by a fire in area C-17.

References: E-15000, XX-E-013, E-13BG01A, E-13BG11B, E-13BG12A, E-13BG52, E-13BN01, E-1F9102, E-1F9302, E-1F9401A, M-12BG03, M-12BN01

5.2.8 Residual Heat Removal

Cables associated with various components in the Train B residual heat removal (RHR) system run in this area. Damage to these cables could affect operation of the Train B RHR system. The Train A RHR system is unaffected by a fire in this area and remains available to ensure shutdown cooling.

Cable 14BNG03BC associated with RWST to Train B RHR pump valve BNHV8812B run in this area. Damage to this cable could prevent opening the valve, which would prevent a suction source to the Train B RHR pump. Cables associated with RWST to Train A RHR pump valve BNHV8812A do not run in this area. Therefore, the RWST is available to provide a suction source to the Train A RHR pump.

References: E-15000, XX-E-013, E-13BN03A, E-13EJ01, E-13EJ04B, E-13EJ08A, E-1F9102, E-1F9205, E-1F9401A, M-12BN01, M-12EJ01

5.2.9 Essential Service Water

Cables associated with Train B essential service water (ESW) system run in this area. As discussed below, damage to these cables could prevent operation of the Train B ESW system. However, the Train A ESW system remains available.

Cables 14EFB01SA and 14EFB01SB are associated with Train B ESW pump PEF01B. Damage to these cables could prevent operation of the pump. Cables associated with Train A ESW pump PEF01A run in a separate fire area.

The service water to/from ESW system cross connect flowpath needs to be isolated for PFSSD to prevent flow diversion from ESW to service water. Each cross connect has four series valves; two on the supply and two on the return. The following table identifies the valves on each ESW Train.

Series Installed Service Water to/from Essential Service Water Cross-Connect Valves			
Train A ESW Supply From SW	**Train B ESW Supply From SW**	**Train A ESW Return To SW**	**Train B ESW Return To SW**
EFHV0023	EFHV0024	EFHV0041	EFHV0042
EFHV0025	EFHV0026	EFHV0039	EFHV0040

At least one valve on the supply and one on the return needs to be closed. Cables associated with valves EFHV0025, EFHV0026, EFHV0039 and EFHV0040 are run in this area. Cables associated with valves EFHV0023, EFHV0024, EFHV0041 and EFHV0042 are unaffected. Therefore, at least one valve on each line will be available to ensure the flowpath can be isolated. In addition, check valve EFV0470 is installed between valves EFHV0023 and EFHV0025 and will prevent flow diversion from Train A ESW to the service water system. Also, check valve EFV0471 is installed between valves EFHV0024 and EFHV0026 and will prevent flow diversion from Train B ESW to the service water system.

The Train B ESW return to ultimate heat sink (UHS) valve EFHV0038 may be affected due to damage to a cable (14EFG06BC) associated with this valve. However, cables associated with the Train A ESW return valve to the UHS (EFHV0037) are unaffected.

Train B ESW pump discharge pressure transmitter EFPT0002 may be affected due to damage to an instrument cable (14EFI08RB). Train A ESW pump pressure transmitter EFPT0001 is unaffected.

Train B ESW pump flow transmitter EFFT0054 may be affected due to damage to an instrument cable (14EFI11FA). Train A ESW pump flow transmitter EFFT0053 is unaffected.

The Train B ESW pump room supply fan may not be available due to damage to cables associated with the fan and dampers. The Train A ESW pump room supply fan is unaffected.

Cable 14RPK09BA supplies 125 VDC power to ESW pump motor B interposing relays 1XEF32, 1XEF34, 1XEF36 located in relay rack RP140. Damage to the cable could prevent operation of the Train B ESW pump. As stated throughout this section, the Train A ESW system is unaffected if a fire occurs in this area.

Cables 14GDY01BA, 14GDY01BB and 14GDY01BD are associated with Train B ESW pump room supply fan CGD01B. Damage to these cables could prevent operation of the supply fan. Train A ESW pump room supply fan CGD01A is unaffected by a fire in this area.

Based on the above discussion, the Train A ESW pump and associated components are available if a fire occurs in area C-17.

References: XX-E-013, E-15000, E-093-00054, E-093-00055, E-13EF02, E-13EF02A, E-13EF03, E-13EF06A, E-13EF11, E-13RP09, E-1F9402A, E-1F9402B, E-1F9403, E-1F9443, E-K3EF01A, E-K3EF08, E-K3GD01A, E-K3GD04, E-K3GD04A, M-12EF01, M-12EF02, M-K2EF01, M-K2GD01

5.2.10 Component Cooling Water

The component cooling water system is required for PFSSD to provide cooling water to the CCP oil coolers, seal water heat exchanger, RHR heat exchanger, RHR pump seal cooler and RCP thermal barriers (to maintain RCP seal cooling in the event RCP seal injection is lost). In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Cables associated with Train B CCW pumps PEG01B and PEG01D run in this area. Damage to these cables could prevent operation of the pumps. Cables associated with Train A CCW pumps PEG01A and PEG01C are run in a different area.

Cable 14EGG05DD, associated with Train B CCW valve EGHV0054, is run in this area. This cable supplies power to auxiliary relay 3XEG10 which provides permissives to open or close valves in the CCW supply to and from the Radwaste building. If Train B CCW is operating at the time of the fire, valve EGHV0054 will be open. Damage to cable 14EGG05DD could cause the control power fuse to blow and prevent closure of EGHV0054 when lining up Train A CCW. A loss of power to NB02, which is possible if a fire occurs in this area, could also prevent closure of valves EGHV0016 and EGHV0054. Operation of Train A CCW with valves EGHV0016 and EGHV0054 open could cause Train A CCW flow to divert to Train B CCW system. Per calculation M-EG-24, the system will continue to operate with no damage to the pumps if the valves in the opposite train are open.

Cable 14GLG06BD, associated with Train B CCW pump room cooler SGL11B, runs in this area. Damage to this cable could prevent automatic operation of the unit. The Train A CCW pump room cooler SGL11A is unaffected by a fire in this area.

Based on the above discussion, the Train B CCW system could be affected by a fire in area C-17 but the Train A CCW system is available.

References: XX-E-013, E-15000, E-13EG01C, E-13EG01D, E-13EG05D, E-13GL06, E-1F9401A, E-1F9444, M-12EG01, M-12GL02, Calculation M-EG-24

5.2.11 Safety Injection Pumps

The PFSSD strategy is to prevent operation of the Safety Injection (SI) pumps to ensure an adequate supply of borated water in the RWST. One cable (14EMB01BB) associated with Train B SI pump is run in area C-17. Damage to this cable could cause the spurious start of the pump and could prevent stopping the pump from the control room.

If the Train B SI pump spuriously starts with the reactor at normal pressure, PFSSD will be assured. The pump will not discharge into the RCS due to the pressure differential between the RCS (2,235 psig) and the SI pump shutoff pressure (1,565 psig). In addition, the setpoint of the discharge relief valve (EM8853B) to the Recycle Holdup Tank is 1,825 psig. Therefore, no inventory is lost from the RWST. With the SI pump operating with no flow, damage to the pump could occur, which is a commercial concern only since the SI pump is not credited in the PFSSD analysis. If necessary, the pump can be stopped by opening breaker NB0202, but this action is not required for PFSSD.

Based on the above discussion, spurious operation of the Train B SI pump will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13EM01, E-1F9102, E-1F9302, M-12EM01, WCRE-01

5.2.12 Containment Spray Pumps

Spurious start of the containment spray (CS) pumps may complicate PFSSD due to the possible depletion of inventory in the RWST. Therefore, a spurious start of the CS pumps should be avoided or mitigated. A control cable (14ENB01BB) associated with the Train B CS pump PEN01B runs through area C-17 and could cause the spurious start of the pump. The cable damage could prevent stopping the pump from the control room.

If the Train B CS pump spuriously starts, normally closed valve ENHV0012 will remain closed, since a spurious containment spray actuation signal (CSAS) is not credible for a fire in area C-17. In addition, cables associated with valve ENHV0012 do not run in area C-17. Therefore, if the CS pump operates, inventory will not be lost from the RWST. If necessary, the pump can be stopped by opening breaker NB0203, but this action is not required for PFSSD.

Based on the above discussion, spurious operation of the Train B CS pump will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13EN01, E-13EN03, E-1F9102, E-1F9302, M-12EN01

5.2.13 Control Room Air Conditioning

The power cable that supplies 480 VAC power to panel GK199C runs in this area. Panel GK199C is the power and control panel for Train B control room A/C unit SGK04B. Damage to this cable will prevent operation of SGK04B.

Cables associated with control room A/C unit SGK04B supply and return dampers GKHZ0040A and GKHZ0040B are run in this area. Damage to these cables could prevent operation of the dampers.

The Train A control room A/C unit SGK04A is unaffected by a fire in this area. Therefore, control room air conditioning is available if a fire occurs in area C-17.

References: XX-E-013, E-15000, E-13GK02A, E-13GK02C, E-13GK02D, E-1F9442, M-12GK01

5.2.14 Class 1E Electrical Equipment Air Conditioning

A number of cables associated with Train B class 1E electrical equipment room A/C unit SGK05B are run in area C-17. Damage to these cables could prevent operation of the unit. Therefore, SGK05B is unavailable if a fire occurs in area C-17.

Power and control cables associated with Train A class 1E electrical equipment room A/C unit SGK05A are unaffected by a fire in this area. However, cables associated with the fire detection alarm panel that initiates shutdown of SGK05A are run in fire area C-17. Cables 16KCQ21FA and 16KCQ21JA run from the main fire alarm panel (KC275) to Halon releasing panel KC230, located on the 2016 elevation of the control building in fire area C-35. Panel KC275 monitors smoke detectors in Halon protected switchboard rooms that are conditioned by SGK05A. Upon receipt of the proper detection sequence at KC275, a normally open auxiliary relay contact in KC275 closes and sends a short circuit signal over cables 16KCQ21FA or 16KCQ21JA to KC230. The short circuit signal received at KC230 initiates actuation of Halon in the affected room and shuts down SGK05A. If the cables are damaged in a fire and short circuit, Halon will be released into the Train A class 1E electrical equipment rooms and class 1E A/C unit SGK05A will shut down.

If SGK05A spuriously shuts down or cannot be started, the spurious fire isolation signal can be bypassed by placing hand switch GKHS0101 in bypass position and the unit can be started using GKHIS0100. Hand switches GKHIS0100 and GKHS0101 are located on panel RP068 in the main control room.

References: XX-E-013, E-15000, E-13GK13, E-13GK13A, E-13GK31, E-13KC21, E-13SA20, E-1F9444, M-12GK03, M-655-00009, M-658-00042, M-658-00043, M-658-00044, DCP 12169

5.2.15 Standby Diesel Generation

Several cables associated with the Train B diesel engine as well as supporting functions are run in area C-17. Damage to these cables could prevent operation of the Train B diesel. Calculation XX-E-013 documents a loss of off-site power evaluation that identifies the fire areas in and around the plant in which a fire could cause a loss of off-site and on-site power. Per XX-E-013 and Section 5.2.16 of this evaluation, a fire in area C-17 could cause a loss of both trains of off-site power and Train B on-site power. The Train A on-site power source remains available.

Damage to cables associated with Train B diesel engine will not adversely affect PFSSD due to the availability of the Train A emergency diesel.

References: XX-E-013, E-15000, E-12KJ01, E-13GM01A, E-13GM04A, E-13JE01, E-13JE04, E-13KJ03A, E-13NE02, E-13NE11, E-13NE13, E-1F9444, E-1F9411B, E-1F9412B, E-1F9423, E-1F9426, M-12GM01, M-12JE01, M-12KJ04, M-12KJ05, M-12KJ06

5.2.16 Class 1E 4.16 kV Offsite Power

Bus NB02 supplies power to Train B Engineered Safety Features (ESF) components. Cables associated with offsite power feeder breakers NB0209 and NB0212 are run in this area. In addition, cables associated with NB02 breaker control power are run in this area. Damage to these cables due to a fire could cause a loss of offsite power to NB02 and could prevent operation of the PFSSD equipment supplied by NB02. As stated in Section 5.2.15, the Train B emergency diesel generator may not be available if a fire occurs in this area.

Cables associated with transformers XNB01 and XNB02 lockout and phase differential relays are run in fire area C-17. Damage to these cables could cause a loss of offsite power on both trains.

Control cables associated with bus NB02 Synchro-scope and associated switches are run in area C-17. Damage to these cables could prevent some of the monitoring functions for NB02, but would not cause a loss of the NB02 bus.

As stated in Section 5.2.15, Train A emergency diesel generator is available and can be lined up to NB01 to provide power to Train A PFSSD loads. Therefore, a loss of offsite power on both trains due to a fire in area C-17 will not impact the ability to achieve and maintain safe shutdown. For a more detailed evaluation of offsite power availability, refer to Calculation XX-E-013.

References: XX-E-013, E-15000, E-1F9425, E-1F9426, E-13NB03, E-13NB04, E-13NB05, E-13NB06, E-13NB10, E-13NB11, E-13NB14, E-13NB15, E-1F9102, E-1F9423, E-1F9425, E-1F9426

5.2.17 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

Cables 14NFK01CA and 14NFK01DA for one of the four UV relays on each bus are run in fire area C-17. Also, cables 14NFY01EA and 14NFY01FA associated with one of the four degraded voltage PTs on each bus are run in fire area C-17. Cables associated with the remaining three UV relays and PTs do not run in fire area C-17. Therefore, automatic functioning of the bus NB01 and NB02 emergency load shedder / sequencer is unaffected by a fire in area C-17 and a spurious start of the associated diesel generator due to a false undervoltage condition on two of the four circuits is not credible.

Cable 14NFK01AA is a DC power cable that runs from NK5412 to NF039C. Damage to this cable could prevent an auto start of the Train B emergency diesel generator upon degraded voltage on 2/4 Train B undervoltage relays or 2/4 input of Train B degraded voltage PTs.

Separation group 4 power cables 14NFY01GA and 14NFY01HA associated with NF039A, NF039B and NF039C are run in this area. Separation groups 1, 2 and 3 power cables associated with these panels are unaffected. Therefore, power to the load shedder/sequencer panels is available.

Based on the above discussion, the Train B emergency diesel generator may not be available if a fire occurs in this area but the Train A load shedder/sequencer is unaffected.

References: XX-E-013, E-15000, E-11NB01, E-11NB02, E-12NF01, E-13NF01, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, E-1F9402A, E-1F9402B, E-1F9403, E-1F9425, E-1F9426

5.2.18 Train B 480 Volt Class 1E Load Centers

Cables associated with Train B 480 VAC Class 1E load centers NG02, NG04 and motor control center (MCC) NG06E are run in area C-17. In addition, as stated in other sections, loss of power to these load centers and MCCs could occur due to loss of Train B off-site and on-site power. Therefore, Train B load centers and MCCs and associated equipment may not be available if a fire occurs in this area.

Cable 14PKK11AA is associated with controlling 480 VAC breaker NG0409. NG0409 supplies 480 VAC power to Train B 125 VDC battery charger PK22, which energizes the PK02 bus. Damage to this cable could disable power to the battery charger but will not de-energize PK02 due to the installed batteries. Battery set PK12 will maintain 125 VDC power to PK02.

Redundant Train A components, supplied by NG01, NG03 and MCC NG05E are unaffected by a fire in area C-17. Therefore, loss of power to Train B 480 VAC Class 1E load centers NG02, NG04 and MCC NG06E will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11NG02, E-13NG01A, E-13NG10A, E-13NG11A, E-13NG11B, E-13PK11, E-1F9422C, E-1F9423, E-1F9424B, E-1F9424D, E-K3NG10A

5.2.19 Class 1E 120 VAC Electrical Distribution System

The Class 1E 120 VAC electrical distribution system provides power to vital instrumentation and control loads for shutdown and normal operation. Under normal conditions, the system is supplied by inverters connected to the 125 VDC NK battery system. Swing inverters allow the primary inverters to be taken out of service for maintenance or repair without disrupting power to the associated vital AC bus. In the event of a loss of power to the inverters, a backup source of power is automatically lined up. The backup power source originates from the 480 VAC electrical distribution system (NG).

Cable 14NNG01AA supplies 480 VAC power from NG0~~0~~2AFF3 to inverter NN14. Cable 14NNG01BA supplies 480 VAC power from NG02ABR1 to inverter NN12. Damage to these cables will disrupt the 480 VAC power source to inverters NN12 and NN14. The 480 VAC power supply to swing inverter NN16 is unaffected.

Cables 14NNK01MA and 14NNK01MB supply 125 VDC power from NK0403 to manual transfer switch NK80. Damage to these cables will disrupt the 125 VDC power supply from NK0403 to swing inverter NN16. The 125 VDC power supply from NK0203 to swing inverter NN16 is unaffected.

Cables 14NNY01HA and 14NNY01HB supply 120 VAC power from swing inverter NN16 to bus NN04 through a manual transfer switch in inverter NN14. Damage to these cables will disrupt the 120 VAC power supply from swing inverter NN16 to NN02. The 120 VAC power supply from inverter NN14 to bus NN04 is unaffected.

As stated in Section 5.2.18, a fire in area C-17 could cause a loss of Train A 480 VAC power. This would cause a loss of 480 VAC power to the Train B NK battery chargers (NK22, NK24 and NK26) which will cause a loss of normal power to the NK02 and NK04 busses. Batteries NK12 and NK14 are unaffected and can supply 125 VDC to busses NK02 and NK04 to provide power to inverters NN12 and NN14 for a limited time.

Train A vital 120 VAC distribution panels NN01 and NN03 are unaffected by a fire in area C-17. Therefore, in the event of a loss of Train B Class 1E 120 VAC electrical distribution system, the Train A Class 1E electrical distribution switchboards are available to supply redundant PFSSD loads.

Based on the above discussion, damage to cables and components associated with Train B vital 120 VAC distribution panels NN02 and NN04 will not adversely impact the ability to achieve and maintain safe shutdown in the event of a fire in area C-17.

References: XX-E-013, E-15000, E-13NN01, E-1F9421

5.2.20 Non-Class 1E 120 VAC Electrical Distribution System

The PFSSD function of the non-Class 1E 120 VAC electrical distribution system is to supply 120 VAC power to Main Control Boards (MCBs) RL017/RL018 and RL021/RL022. The power is split at the MCB to supply specific PFSSD components.

The PFSSD components that depend on 120 VAC power from RL017/RL018 are Residual Heat Removal (RHR) discharge valves EJHCV0606 (Train A) and EJHCV0607 (Train B). Non-class 1E switchboard panel PN07 supplies power from switch PN0736 to valve positioner EJHY0606. Valve positioner EJHY0606 controls the position of EJHCV0606 using hand controller EJHIC0606. Non-class 1E switchboard panel PN08 supplies power from switch PN0833 to valve positioner EJHY0607. Valve positioner EJHY0607 controls the position of EJHCV0607 using hand controller EJHIC0607.

The PFSSD components that depend on 120 VAC power from RL021/RL022 are temperature recorders BBTR0423, BBTR0433 and BBTR0443. Non-class 1E switchboard panel PN07 supplies power from switch PN0738 to temperature recorder BBTR0423. Non-class 1E switchboard panel PN08 supplies power from switch PN0835 to temperature recorders BBTR0433 and BBTR0443.

Cables 14PNG01AD and 14PNG01AE supply 480 VAC power from NG002BBF1 to 480/120V transformer XPN08A. Damage to either of these cables due to a fire in area C-17 will result in a loss of power to the transformer and loss of 120 VAC feed to PN08 from this power source.

Cable 16PNY01AR provides an alternate power feed to switchboard PN08 from PG20GER5. Cables 16PNY01AW, 16PNY01AX, 16PNY01AY and 16PNY01AZ are also associated with the alternate power supply to PN08. Damage to these cables will result in a loss of the alternate power feed to PN08.

A loss of power to PN08 will result in a loss of power to EJHY0607, which will fail valve EJHCV0607 open and will prevent control of the valve from the control room. Loss of power to PN08 will also result in a loss of loops 3 and 4 temperature recorders BBTR0433 and BBTR0443, respectively.

Non-Class 1E 120 VAC power to panel PN07 is unaffected by a fire in this area. Train A RHR valve EJHCV0606 is unaffected by a fire in area C-17, so Train A RHR can be used for shutdown cooling. Also, operators can use available temperature indication on loops 1 and 2 if a loss of loops 3 and 4 temperature indication occurs.

References: XX-E-013, E-15000, E-13PN01, E-13PN01A, E-13RL01, E-13RL04, E-13RL06, E-1F9201, E-1F9205, E-1F9421, E-1F9424E

5.2.21 Class 1E 125 VDC Distribution System

Power cables associated with the Class 1E 125 VDC electrical distribution system are run in area C-17. These cables supply 125 VDC power to various PFSSD loads. The cables and supplied PFSSD equipment are summarized in the following table.

CABLE	NK BREAKER	PFSSD Components
14RLK01AA	NK04407	BGHV8153B, BGHV8154B
14RLK01BA	NK04409	FCFY0310
14RLK01CA	NK04412	EMHV8843, EMHV8871, EPHIS8808B, EPHIS8808D
14RLK01DA	NK04413	EGTV0030, GMHZ0019
14RLK01EA	NK04414	BBHV8001B, BBHV8002B
14RLK01FA	NK04411	BMHV0001, BMHV0002, BMHV0003, BMHV0004

Damage to these cables could cause a loss of power to the indicated components. This is acceptable for PFSSD since the components fail in the desired PFSSD position upon loss of power, or the redundant Train A component is available to perform the PFSSD function.

Damage to cable 14RLK01CA could cause a loss of position indication for accumulator injection valves EPHV8808B and EPHV8808D. Loss of position indication for these valves will not impact PFSSD since the valves will continue to perform their intended function without indication.

References: XX-E-013, E-15000, E-13BB30, E-13BG48, E-13BM06A, E-13EG16, E-13EM04, E-13EM04A, E-13EP02A, E-13FC21, E-13GM04A, E-13RL01, E-13RL02, E-13RL03, E-13RL04, E-13RL05, E-13RL06, E-13RL07, E-1F9101, E-1F9201, E-1F9301, E-1F9302, E-1F9401A, E-1F9422B, E-1F9444, M-12BB04, M-12BG01, M-12BM01, M-12EG02, M-12EM01, M-12EM02, M-12EP01, M-12FC02, M-12GM01

5.2.22 Main Steam Isolation Bypass Valves

Cable 14RPK09AA supplies 125 VDC power from NK4417 to auxiliary relay panel RP210. The PFSSD loads supplied by this cable are as follows:

- Relay 94XAB06
- Solenoid valve ABHY0012B
- Solenoid valve ABHY0015B
- Solenoid valve ABHY0018B
- Solenoid valve ABHY0021B

The solenoid valves listed above are associated with MSIV bypass valves ABHV0012, ABHV0015, ABHV0018 and ABHV0021. Each MSIV bypass valve is normally closed and is required to remain closed for PFSSD. Two (2) redundant solenoid valves (one on each train) are installed on the air supply line and control air to the pneumatic actuator. Both solenoids on the associated valve are required to be energized to open the valve.

Damage to cable 14RPK09AA will cause a loss of power to the relay and solenoids and fail the valves closed, which is the desired PFSSD position. Therefore, damage to this cable will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13AB23B, E-13BM06A, E-13RP09, E-1F9101, E-1F9422B, E-093-00050, E-093-00051

5.2.23 Lockout Relay Panel RP335

Cable 14RPK09NA provides Class 1E 125 VDC power from NK4419 to panel RP335. Damage to this cable could disrupt power to the loads served by panel RP335, which could prevent operation of the associated equipment. The following table identifies the PFSSD equipment powered by this cable.

Panel RP335 PFSSD Relays	
Relay #	**Description**
86XRP5	Train B MDAFP from CST and ESW Supply Valves (ALHV0034 and ALHV0030)
86XRP6	ESW to TDAFP Supply Valve (ALHV0033)
86XRP7	Train B MDAFP (PAL01B)

As discussed in Section 5.2.4, Train A auxiliary feedwater is available and is unaffected by a fire in area C-17. Therefore, damage to cable 14RPK09NA will have no adverse impact on PFSSD.

Other cables associated with control room lockout relays are run in area C-17. Damage to these cables could prevent operation of associated equipment. Train A equipment, located in a separate fire area, is available and is unaffected by the fire.

References: XX-E-013, E-15000, E-13AL01B, E-13AL02B, E-13AL04B, E-13RP09, E-13RP15, E-093-00095, E-093-00096, E-1F9202, E-1F9204

5.2.24 Miscellaneous Control Room Panels

Cables 14RPY09BA and 14RPY09CA provide 120 VAC power to control room panels RP053BA, RP053BB and RP053BC. Cable 14RPY09GA provides 120 VAC power to panel RP147B. Cable 14RPY10BA provides 120 VAC power to panel RP068. The following table identifies the PFSSD components that could be affected by a loss of Train B 120 VAC power to these panels.

Cable	Power Supply	Affected Components
14RPY09BA	NN0416	ABHS0004, ABPIC0004A, ALFT0007, ALFY0007B, ALHK0005A, ALHK0007A, ALHK0010A, ALHK0012A, ALHS0007, ALHS0012, ALHV0012, ALPI0024A, EFFI0054, EFFT0054, EFPI0002, EFPT0002, JELSL0021C, JELT0021, RP118B
14RPY09CA	NN0418	ALHY0012, ALPT0039, ALPY0039A, EGFT0129, EGPSL0078, EGPT0078, GDTE0011, GDTSL0011, GDTZ0011A
14RPY09GA	NN0404	ABHS0004, ABPIC0004B, ABPT0004, ABPY0004, ALFT0001, ALFY0005B, ALHK0005A, ALHK0005B, ALHK0010A, ALHK0010B, ALHS0005, ALHS0010, ALHV0010, ALHY0010, ALPI0024B, ALPT0024, RP118B
14RPY10BA	NG02ACR136	GDHIS0011A (CGD01B)

Loss of power to these components will not adversely impact PFSSD. Redundant Train A components are unaffected by the fire or the component fails in the desired PFSSD position.

References: XX-E-013, E-15000, E-13AL03A, E-13AL03B, E-13AL05A, E-13AL05B, E-13AL07A, E-13AL07B, E-13AL08, E-13AL09, E-13AB20B, E-13EF11, E-13EG01C, E-13EG01D, E-13EG13, E-13EG19, E-13GK07, E-13JE01, E-13JE04, E-13RP09, E-13RP10, E-1F9101, E-1F9202, E-1F9203, E-1F9204, E-1F9401B, E-1F9402B, E-1F9411B, E-1F9421, E-1F9424B, E-1F9443, E-K3GD01A, E-K3GD04, E-K3GD04A, E-K3EF08, E-K3GD01A, J-110-00592, J-110-00593, J-110-00596, M-12AB01, M-12AL01, M-12EF01, M-12EG01, M-12JE01, M-K2EF01, M-K2GD01

5.2.25 ESFAS Actuation Cabinet SA036B

Cables 14SAK21BA and 14SAY21BA provide 125 VDC and 120 VAC power, respectively, to panel SA036B. Panel SA036B houses the controls for Channel 4 Engineered Safety Features Actuation System (ESFAS). Damage to these cables could prevent operation of the Channel 4 ESFAS. However, Channels 1 and 2 ESFAS are unaffected by the fire and will remain operable to perform the required PFSSD functions.

References: XX-E-013, E-15000, E-13SA21, E-1F9202, E-1F9402A, E-1F9402B

5.2.26 Reactor Protection System

The Reactor Protection System (RPS) monitors specified input parameters and initiates reactor protection features whenever those parameters are outside specified limits. Field installed transmitters continuously monitor various parameters and report the results to one of four process cabinets, one per channel. Signals are then sent from the process cabinets to both solid state protection cabinets, one on each train. The cabinets and associated channel are listed below:

<u>Process Cabinets</u>

- Cabinet SB038 - Channel 1
- Cabinet SB042 - Channel 2
- Cabinet SB037 - Channel 3
- Cabinet SB041 - Channel 4

<u>Solid State Protection Cabinets</u>

- Cabinet SB029A - Train A Input Cabinet
- Cabinet SB029B - Train A Logic Cabinet
- Cabinet SB029C - Train A Output Cabinet 1
- Cabinet SB029D - Train A Output Cabinet 2
- Cabinet SB032A - Train B Input Cabinet
- Cabinet SB032B - Train B Logic Cabinet
- Cabinet SB032C - Train B Output Cabinet 1
- Cabinet SB032D - Train B Output Cabinet 2

The RPS is actuated upon 2/3 or 2/4 coincident logic, depending on the input parameter. This ensures that a loss of a single channel will not prevent the system from performing its function.

Power cables for certain RPS cabinets are run in area C-17. These cables originate from the separation group 4 (Train B) source. Power cables originating from the separation group 1 source (Train A) are unaffected by a fire in area C-17. The following table summarizes the RPS power cables that could be affected by a fire in this area, as well as the power supply and component served by the cable, and identifies the available power source or component.

RPS POWER CABLES RUN IN AREA C-17			
CABLE	**POWER SUPPLY**	**RPS COMPONENT SERVED**	**AVAILABLE POWER SOURCE(s)**
14SBS01DC	NN0409	SB029A - Train A Input Channel 4	NN0110 - Channel 1 NN0210 - Channel 2 NN0309 - Channel 3
14SBS02DC	NN0410	SB032A - Train B Input Channel 4	NN0109 - Channel 1 NN0209 - Channel 2 NN0310 - Channel 3
14SBS05BE	NN0412	SB032D - Train B Output Cabinet 2	NN0112 powers redundant Train A output cabinet SB029D
14SBS05BF	NK4416	SB032D - Train B Output Cabinet 2	Cable damage will cause main steam dumps to close, which is the desired PFSSD position. Otherwise, the MSIVs are available to isolate steam flow. NK4118 powers redundant Train A output cabinet SB029D
14SBS10BB	NK5410	SB102B - Reactor Trip Swgr Train B	NK4116 powers redundant Train A cabinet SB102A
14SBY09FA	NN0414	SB041 - Process Protection Rack Channel 4	NN0111 powers SB038 (CH 1) NN0212 powers SB042 (CH 2) NN0311 powers SB037 (CH 3)

Based on the above table, a fire in this area could result in a loss of power to input channel 4 in SB029A and SB032A, but will not result in a loss of input channels 1, 2 and 3. In addition, Train B output cabinet 2 and Train B reactor trip switchgear cabinet could lose power. Train A output cabinets and Train A reactor trip switchgear cabinet are unaffected. Power to channel 4 process protection rack SB041 could be affected but channels 1, 2 and 3 process protection racks remain available.

References: XX-E-013, E-15000, E-11NK01, E-11NK02, E-13NN01, E-13SB01, E-13SB02, E-13SB05, E-13SB09, E-13SB10, E-13SB12A, E-1F9101, E-1F9102, E-1F9103, E-1F9203, E-1F9205, E-1F9301, E-1F9302, E-1F9421, E-1F9422B, E-1F9431, E-1F9432, E-1F9433

5.2.27 Process Monitoring Instrumentation

Circuits for a number of process instruments are run in area C-17. These circuits run from various process monitoring panels to the auxiliary shutdown panel (ASP) and provide indication at the ASP for control outside the control room. Each cable, along with the effects of fire damage to the cable, is discussed below.

Cable 14SBS16AA provides RCS cold leg loop 2 wide range temperature indication at the ASP on indicator BBTI0423X. Damage to this cable could cause a false temperature indication at the ASP but will not cause a loss of indication in the control room. Therefore, damage to this cable will not adversely impact PFSSD.

Cables 14SBS16BA and 14SBS16YA are associated with steam generator D wide range level indicator AELI0504A located at the ASP. Damage to these cables could cause a false level

indication at the ASP but will not cause a loss of indication in the control room. Therefore, damage to these cables will not adversely impact PFSSD.

Cable 14SBS16EA provides RCS hot leg loop 4 wide range temperature indication at the ASP on indicator BBTI0443A. Damage to this cable could cause a false temperature indication at the ASP but will not cause a loss of indication in the control room. Therefore, damage to this cable will not adversely impact PFSSD.

Cable 14SBS16NA provides RCS wide range pressure indication at the ASP on pressure indicator BBPI0406X. Damage to this cable could cause a false pressure indication at the ASP but will not cause a loss of indication in the control room. Therefore, damage to this cable will not adversely impact PFSSD.

Cable 14SBS16XA provides steam generator B wide range level indication at the ASP on indicator AELI0502A. Damage to this cable could cause a false level indication at the ASP but will not cause a loss of indication in the control room. Therefore, damage to this cable will not adversely impact PFSSD.

Cable 14SBS16ZA provides pressurizer narrow range level indication at the ASP on indicator BBLI0460B. Damage to this cable could cause a false level indication at the ASP but will not cause a loss of indication in the control room. Therefore, damage to this cable will not adversely impact PFSSD.

Based on the above discussion, damage to process instrumentation cables due to a fire in area C-17 will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13AE08, E-13BB15, E-13BB16, E-13SB16, E-1F9201, E-1F9203, E-1F9301, M-12AE02, M-12BB01, M-12BB02, M-12BB04

5.2.28 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B.

Cable 14SES07BA is a power cable associated with SR monitor signal processor SENY0061B. Cable 14SES07CA is a power cable associated with SR monitor amplifier SENY0061A. Damage to these cables could prevent operation of the associated source range monitor. Source Range monitoring remains available for a fire in area C-17 using SENE0031, SENE0032 and SENY0060A/B.

For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013.

References: E-15000, XX-E-013, E-13SE07, E-1F9101

5.2.29 Process Monitoring Fire Isolation Cabinets SB148A and SB148B

The PFSSD function of cabinets SB148A and SB148B is to provide reliable process monitoring instrumentation at the auxiliary shutdown panel (ASP) in the event of a fire in the control room. This allows operators the ability to monitor critical process variables during shutdown from outside the control room. Process variables that can be monitored at the ASP as well as in the main control room (MCR) are as follows:

- AELT0502 – Steam Generator B Wide Range Water Level (SB148A)
- AELT0504 – Steam Generator D Wide Range Water Level (SB148B)
- BBLT0460 – Pressurizer Level Transmitter Narrow Range (SB148A)
- BBTE0423B – RCS Loop 2 Cold Leg Temperature Element (SB148A)
- BBTE0443A – RCS Loop 4 Hot Leg Temperature Element (SB148A)

- BBPT0406 – RCS Wide Range Hot Leg Pressure Transmitter (SB148B)

The instrument cable from each transmitter or temperature element runs to the SB148 cabinet indicated above. The signal is split and runs to the ASP and MCR via independent instrument cables. Cable 14SBY09HA is a power cable that provides 120 VAC to cabinet SB148B. A loss of power to SB148B could result in a loss of capability to monitor AELT0504 and BBPT0406 from the ASP and the MCR.

A loss of capability to monitor AELT0504 and BBPT0406 from the MCR will not adversely impact PFSSD. Redundant capability exists to monitor these variables as described below:

- AELT0547, AELT0548, AELT0549 and AELT0554 are available to provide level indication (narrow range) for steam generator D to associated indicators in the control room.
- BBPT0405 is available to provide RCS pressure to pressure indicator BBPI0405.

Based on the above discussion, a fire in area C-17 that affects the process monitoring instrumentation associated with cabinet SB148B will not impact the ability to achieve and maintain PFSSD due to the availability of redundant process monitoring instrumentation in the control room.

References: XX-E-013, E-15000, E-13AE08, E-13BB15, E-13BB16, E-13SB09, E-13SB16, E-13NN01, E-1F9201, E-1F9203, E-1F9205, E-1F9301, E-1F9421, M-12AE02, M-12BB01, M-12BB04

5.2.30 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs.

One control cable associated with reactor coolant pumps C and D is run in fire area C-17. Damage to these cables in the event of a fire could prevent operators from stopping the C and D RCPs from the control room. However, a fire in C-17 will not cause a loss of all seal cooling since RCP seal injection and thermal barrier cooling remain available.

Based on the above discussion, the inability to trip the C and D RCPs from the control room will have no adverse impact on PFSSD. The pumps can continue to operate, providing forced flow circulation. If the pumps spuriously stop, natural circulation cooldown can be used.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1

5.2.31 Steam Generator Feedwater Pumps

Main feedwater pump steam supply valves FCFV0005 and FCFV0105 are credited in the PFSSD analysis to trip the main feedwater pumps if the main steam isolation valves (MSIVs) are affected by a fire. Closing the MSIVs stops steam flow to the feedwater pumps' turbines and stops the feedwater pumps. The steam generator feedwater pumps are tripped in the event of a fire to prevent overfilling the steam generators.

Non-Class 1E 120 VAC Inverter PN10 and distribution panel PN10A provide power to FCFV0105 trip relays in panel FC170C. Cable 16RPY10AA supplies power from PN0806 to inverter PN10. Cable 16FCY35AA provides the primary source of 120 VAC power from distribution panel PN010A to panel FC170A. The alternate source of power to panel FC170A is not credited for PFSSD and is assumed lost.

A fire in area C-17 could damage cables 16FCY35AA or 16RPY10AA. If this occurs, operators in the control room would not be able to close valve FCFV0105 to stop steam flow to steam generator feedwater pump PAE01B.

A fire in area C-17 will not affect the ability to close the MSIVs from the control room. All-close hand switch ABHS0080 is unaffected and can be used to close the MSIVs from the control room.

Based on the above discussion, valve FCFV0105 may not close if a fire occurs in this area. However, the MSIVs can be closed using hand switch ABHS0080 in the main control room. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-13FC35, E-13RP10, E-1F9103, E-1F9421

5.2.32 Load Center Feeder Breaker PA0207

Load center feeder breaker PA0207 is credited for PFSSD because it supplies power to credited non-safety related loads. Cable 16PGA11AC, associated with PA0207, runs in this area. A fire induced short circuit in this cable will trip the associated breaker.

Breaker PA0207 supplies power to the following PFSSD components:

- PG20GBR217 – MCB Misc. Power Circuits RL023
- PG20GER5 – Instr. Bus Transformer Alt. Feed XPN08D

PFSSD components powered from PG20GBR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG20GER5 is credited as one source of power to PN08. The redundant source of power from NG02BBF1 may also be affected by a fire in this area as discussed in Section 5.2.18. Redundant components powered from inverter PN07 are unaffected by a fire in this area.

Based on the above discussion, loss of breaker PA0207 will not adversely affect PFSSD if a fire occurs in this area.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-11PK02, E-13PG10, E-13PG11, E-13RL07, E-13SC12, E-1F9421, E-1F9422C, E-1F9424E, KD-7496, DCP 13324

FIRE AREA C-18

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-18 is located on the 2016 elevation of the Control Building and includes the room listed in Table C-18-1.

Table C-18-1
Rooms Located in Fire Area C-18

ROOM #	DESCRIPTION
3419	North Electrical Chase - 2016 Elevation

Fire area C-18 is protected with an automatic wet-pipe sprinkler system and automatic fire detection. The area is separated from adjacent areas by minimum 3-hour fire resistant construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-18-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-18-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-18

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Steam generator A ARV control may be lost. Cooldown is assured using Aux Feedwater Pump B supplying steam generator D and the Turbine Driven Auxiliary Feedwater Pump supplying steam generators B and C. Steamline pressure indicators ABPI0514A, ABPI0524A, ABPI0534A and ABPI0544A may not be available. Monitor steamline pressure on loops 2, 3 and 4 using pressure indicators ABPI0525A, ABPI0526A, ABPI0535A, ABPI0536A, ABPI0545A and ABPI0546A. ABHS0080 may not be available to close the MSIVs and MSIV bypass valves. ABHS0079 is available to close the MSIVs and MSIV bypass valves.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-18.
AE	Main Feedwater	H, P	All PFSSD functions associated with the main feedwater system are satisfied. Steam generator (SG) level indication is available on SG A using narrow range level transmitters AELT0517, AELT0518, and AELT0519. Steam generator level indication is available on SG D using wide range level transmitter AELT0504 and narrow range level transmitters AELT0547, AELT0548, and AELT0549. AEHS0080 may not be available to close the MFIVs. Isolate all four MFIVs using hand switch AEHS0081.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. Train B MDAFP is available to supply SGs A and D, however SG A ARV ABPV0001 could spuriously open and may need to be failed closed. The TDAFP is available to supply SGs B and C. Pressure transmitter/indicator ALPT0037/ALPI0037 may be affected. Auxiliary feedwater suction pressure indication is available using pressure transmitters/indicators ALPT0038/ALPI0038A and ALPT0039/ALPI0039A.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-18.

Table C-18-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-18

System	System Name	PFSSD Function*	Comments
BB	Reactor Coolant System	R, M, H, P, S	Pressurizer PORV BBPCV0455A may open and block valve BBHV8000A may not close. If this occurs, Operators can close the PORV by placing BBHIS0455A in the CLOSE position. RCS pressure transmitter BBPT0405 could be affected. RCS pressure indication is available using BBPI0406. Pressurizer level transmitter BBLT0459 could be affected. Pressurizer level indication is available using BBLI0460A. Pressurizer pressure transmitter BBPT0455 could be affected. Pressurizer pressure transmitters BBPT0456, BBPT0457 and BBPT0458 are unaffected. Therefore, pressurizer pressure indication is available using BBPI0456, BBPI0457 or BBPI0458. RCS Loop 1 Wide Range Cold Leg Temperature Element BBTE413B and RCS Loop 4 Wide Range Hot Leg Temperature Element BBTE443A are available. Loss of inventory through the head vent valves is prevented by maintaining valves BBHV8002A and either BBHV8001B or BBHV8002B closed. RCP thermal barrier cooling could be affected due to spurious closure of BBHV0013, BBHV0014, BBHV0015 and BBHV0016. Reactor coolant pumps A and B may not stop using the control room hand switch. RCP seal injection remains available. Therefore, the inability to stop the RCPs will have no adverse impact on PFSSD. Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, pressurizer spray can be stopped by closing KAFV0029 using KAHIS0029 in the main control room.
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. Train B Centrifugal Charging Pump (CCP) is available to provide charging flow from the RWST to the RCP seals through valve BGHV8357B. VCT level indicator BGLI0112 could be affected. Level indicator BGLI0185 should be used to determine VCT level. Normal charging is isolated using BGHIS8105 to close valve BGHV8105. Cables for valve BGHV8106 could be damaged. Valve BGHV8153A and either BGHV8153B or BGHV8154B are maintained closed to isolate excess letdown. Letdown isolation valves BGLCV0459 and BGLCV0460 and letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C may need to be failed closed by closing valve KAFV0029 using KAHIS0029 in the main control room. RCP seal flow indication is available using BGFI0215B. RCP seal flow indicator BGFI0215A may be affected.
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blowdown system are satisfied. Steam generator blowdown is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A, located on the RL024 panel in the main control room.

Table C-18-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-18

System	System Name	PFSSD Function*	Comments
BN	Borated Refueling Water Storage System	R, M, H	The RWST is available to provide a suction source to Centrifugal Charging Pump B via valve BNLCV0112E.
EF	Essential Service Water System	H, S	All PFSSD functions associated with the essential service water system are satisfied. Train A ESW is unavailable due to damage to a number of associated components. Train B ESW is unaffected.
EG	Component Cooling Water System	S	All PFSSD functions associated with the component cooling water system are satisfied. A number of Train A CCW system components could be affected. The Train B CCW system is unaffected. CCW flow to the RCP thermal barriers could be affected as discussed in BB System comments above. CCW to RCP flow indicator EGFI0128 could be affected. CCW to RCP flow indicator EGFI0129 is unaffected. Valve EGHV0101 could be affected, preventing operation of Train A RHR. Valve EGHV0102 is unaffected.
EJ	Residual Heat Removal System	M, H, P	A number of Train A RHR components may be affected. The Train B RHR pump is unaffected but valve EJHV8701B may need to be manually opened or a cold shutdown repair made when aligning Train B RHR for shutdown cooling. The Train A RHR system could be affected. The Train B RHR system is unaffected.
EM	High Pressure Coolant Injection	R, M	All PFSSD functions associated with the high pressure coolant injection system are satisfied. BIT inlet valve EMHV8803A may be affected but valves EMHV8801A, EMHV8801B and EMHV8803B are available to ensure an available BIT flowpath using Train B CCP. The Train A SI Pump may spuriously start but the spurious actuation will not adversely impact PFSSD since the pump will be dead headed against RCS pressure. Therefore, no inventory will be lost from the RWST. In this condition, the pump could experience cavitation damage but this is a commercial concern, not a PFSSD concern. Operators can disconnect power to the pump by opening breaker NB0103, but this action is not required for PFSSD. SI test line valves EMHV8882 and EMHV8964 could be affected. The SI test line can be isolated by closing valve EMHV8871.
EN	Containment Spray	R, M	Containment spray pump PEN01A could spuriously start and valve ENHV0006 could open, causing flow to the containment spray nozzles. Pump PEN01A can be stopped by opening breaker NB0102 in area C-9.
EP	Safety Injection Accumulators	H	A containment entry may be required to close SI Accumulator injection valves EPHV8808A and EPHV8808C if these valves are unresponsive from the control room. The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-18.
FC	Auxiliary Turbines	R, H, P	Valve FCFV0005 may be affected. The MSIVs can be closed using all-close hand switch ABHS0079.

Table C-18-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-18

System	System Name	PFSSD Function*	Comments
GD	ESW Pump House HVAC	S	Train A ESW pump room ventilation system could be affected. Train B ESW pump room ventilation system is unaffected.
GF	AFW Pump Room Coolers	S	Train A AFW pump room cooler SGF02A could be affected. Train B AFW pump room cooler is unaffected.
GK	Control Room and Class 1E Switchgear Room Coolers	S	Train A control room A/C unit SGK04A may be affected. Train B control room A/C unit SGK04B is unaffected. Train A Class 1E electrical equipment room A/C unit SGK05A may be affected. Train B Class 1E electrical equipment room A/C unit SGK05B is unaffected.
GL	Auxiliary Building HVAC	S	Train A RHR pump room cooler SGL10A could be affected. Train B RHR pump room cooler SGL10B is unaffected. Train A CCP room cooler SGL12A could be affected. Train B CCP room cooler SGL12B is unaffected. Train A CCW pump room cooler SGL11A and associated dampers could be affected. Train B CCW pump room cooler SGL11B is unaffected.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-18.
GN	Containment Coolers	S	Containment pressure transmitter GNPT0937 could be affected. Containment pressure transmitters GNPT0934, GNPT0935 and GNPT0936 are unaffected. Train A containment cooler fans SGN01A and SGN01C could be affected. Train B containment cooler fans SGN01B and SGN01D are unaffected.
JE	Diesel Fuel Oil	S	Low standpipe level switch JELSL0001C may be affected due to loss of power to RP053AC. This could prevent operation of the Train A diesel fuel oil transfer pump PJE01A on low standpipe level. The Train B diesel fuel oil transfer pump PJE01B is unaffected by a fire in this area. Train A emergency fuel oil transfer pump could be affected. Train B emergency fuel oil transfer pump is unaffected.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-18.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-18.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-18.
KJ	Standby Diesel Engine	S	Train A diesel engine may be affected by a fire in this area. Train B diesel engine is unaffected.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-18.

Table C-18-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-18

System	System Name	PFSSD Function*	Comments
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-18.
NB	4.16 kV System	S	Train A Class 1E 4.16 kV switchgear bus NB01 may be affected. Train B Class 1E 4.16 kV switchgear bus NB02 is unaffected.
NE	Standby Diesel Generator	S	Train A diesel generator may be affected by a fire in this area. Train B diesel generator is unaffected.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function associated with the load shed/emergency load sequencing system is satisfied. Cables associated with one of the four undervoltage relays and degraded voltage potential transformers on Trains A and B are run in area C-18. Emergency load shed/sequencer operates when 2/4 UV relays sense undervoltage on the bus. Therefore, Trains A and B Load Shed and Emergency Load Sequencing will be available.
NG	480V Load Centers and MCCs	S	Loss of power to NB01 will result in a loss of power to Train A 480 V load centers and MCCs. Redundant Train B 480 V load centers and MCCs are unaffected.
NK	125VDC	S	Train A class 1E 125 VDC power could be disrupted to control room panels RL001/RL002, RL017/RL018, RL019/RL020 and RL021/RL022. The normal source of power to NK01 and NK03, through the Train A 480 V distribution system, could be disrupted. 125 VDC battery sets NK011 and NK013 are unaffected. Train B class 1E 125 VDC power is unaffected.
NN	120VAC	S	Train A Class 1E 120 VAC electrical distribution system may be affected. Train B Class 1E 120 VAC electrical distribution system is unaffected.
PA	13.8kV	S	Breakers PA0105 and PA0106 could be affected by a fire in this area. Redundant capability is available.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-18.
PG	480V Load Centers and MCCs	S	Loss of all power on bus NB01 will result in Separation Group 5 PG busses losing power. Off-site and on-site power to NB02 and Separation Group 6 PG busses are unaffected. Breaker PG1901 could be affected. Redundant capability is available.
PK	125VDC	S	Battery charger PK21 could be affected. Battery charger PK22 is unaffected.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-18.
PN	120VAC	S	Power to non-class 1E 120 VAC switchboard PN07 may be affected. Non-class 1E 120 VAC switchboard PN08 is unaffected.

Table C-18-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-18

System	System Name	PFSSD Function*	Comments
QB	Standby AC Lighting	S	Standby AC lighting in the main control room could be affected due to loss of Train A off-site power and the Train A emergency diesel generator. Self-contained battery powered lighting units are available to provide lighting in the control room.
QD	Emergency Lighting	S	The 125 VDC emergency lights in the control room could be affected. Self-contained battery powered lighting units are available to provide lighting in the control room.
RL	Control Room MCB	S	Train A class 1E 125 VDC power could be disrupted to control room panels RL001/RL002, RL017/RL018, RL019/RL020 and RL021/RL022. Train B class 1E 125 VDC power is unaffected. Non class 1E 120 VAC power from separation group 5 to RL017/RL018 and RL021/RL022 could be affected. Non class 1E 120 VAC power from separation group 6 to RL017/RL018 and RL021/RL022 is unaffected.
RP	Miscellaneous Control Panels	R, M, H, P, S	Train A components and cables associated with this system could be affected. Train B components and cables associated with this system are unaffected. 120 VAC power to panel RP053A could be affected. Power to panels RP053B, RP053D and RP147 is unaffected. Certain PFSSD functions associated with panels RP068, RP139, RP209, RP211 and RP330 could be affected. Redundant capability exists and is unaffected by a fire in this area.
SA	ESFAS	S	Auxiliary feedwater low suction pressure (LSP) signal monitored by panel SA036A could be affected. Auxiliary feedwater LSP signals monitored by panels SA036B and SA036C are unaffected. Status indication of Train A class 1E electrical equipment A/C unit SGK05A at status panel SA066A could be affected. Status indication of Train B class 1E electrical equipment A/C unit SGK05B is unaffected.
SB	Reactor Protection System	R, S	A loss of power to input channel 1 in SB029A and SB032A could occur. Input channels 2, 3 and 4 remain available. Train A output cabinet 2 and Train A reactor trip switchgear cabinet could lose power. Train B output cabinets and Train B reactor trip switchgear cabinet are unaffected.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-18.
SE	Ex-Core Neutron Monitoring	R, P	Source range monitor SENE0031, SR monitor signal processor SENY0060B and SR monitor amplifier SENY0060A could be affected. Source range monitoring remains available using SENE0032 and SENY0061A/B.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-18.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-18.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-18. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs

To prevent uncontrolled cooldown due to a spuriously opened ARV ABPV0001, fail the ARV closed by isolating air and nitrogen to the valve using KAV1435 (air) and KAV1364 (nitrogen), and venting air from the regulator. These valves are located in area A-23 and access is available without having to traverse fire area C-18.

3.1.2 Containment Spray (OMA, refer to E-1F9900)

Containment spray pump PEN01A could spuriously start and valve ENHV0006 could open, causing containment spray. The pump can be stopped by opening breaker NB0102 in area C-9.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Main Steam Isolation Valves and MSIV Bypass Valves

The capability to isolate the MSIVs and bypass valves using hand switch ABHS0080 may be affected. The MSIVs and bypass valves can be isolated using hand switch ABHS0079.

3.2.2 Main Feedwater Isolation Valves

The capability to isolate the MFIVs using hand switch AEHS0080 may be affected. Isolate the MFIVs using hand switch AEHS0081.

3.2.3 Component Cooling Water

Train A CCW could be affected by a fire in this area. If this occurs, swap to Train B CCW using normal operating procedures if Train B CCW is not already running. Loss of CCW flow to the RCP thermal barriers can be diagnosed using flow indicator EGFI0129 on panel RL020.

3.2.4 Reactor Coolant Pump Seal Cooling

Thermal barrier cooling could be affected. RCP seal injection could temporarily be disrupted until the Train B CCP is lined up. The Train B CCP can be started and lined up from the control room. RCP seal flow indication is available using BGFI0215B.

3.2.5 Pressurizer PORV/Block Valve

Pressurizer PORV BBPCV0455A could spuriously open and block valve BBHV8000A may not close. If this occurs, Operators can close the PORV by placing BBHIS0455A in the CLOSE position. Pressurizer pressure indication is available using BBPI0456, BBPI0457 and BBPI0458 located on RL002.

3.2.6 Normal Pressurizer Spray

Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, the spray can be stopped by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer pressure indication is available using BBPI0456, BBPI0457 and BBPI0458.

3.2.7 Isolation of Letdown

A fire in area C-18 could prevent valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B, and BGHV8149C from being closed using their associated control room hand switches. If this occurs, the valves can be closed by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer level indication is available using BBLI0460A.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 Residual Heat Removal

Valve EJHV8701B may need to be manually opened or a cold shutdown repair made when aligning Train B RHR for shutdown cooling.

3.3.2 Safety Injection Accumulators

A fire in area C-18 may require a containment entry to close SI Accumulator injection valves EPHV8808A and EPHV8808C if these valves are unresponsive from the control room. The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig.

4.0 CONCLUSION

With some exceptions, redundant Post Fire Safe Shutdown capability exists if a severe fire occurs in area C-18. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-18.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-18

There are no PFSSD components located in area C-18. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-18-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-18. The applicable evaluation section is also listed in Table C-18-3.

Table C-18-3
PFSSD Cables Located in Fire Area C-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ABI20EA	3419	ABPT0001	I	5.2.1	SG A ARV ABPV0001 Pressure Transmitter
11ABI20EC	3419	ABPV0001	I	5.2.1	SG A ARV Press Controller at RP118A
11ABI20ED	3419	ABPV0001	I	5.2.1	SG A ARV Press Controller at RP118A
11ABI21JA	3419	ABPT0514	I	5.2.2	Steam Generator A Pressure Transmitter
11ABI21MA	3419	ABPT0524	I	5.2.2	Steam Generator B Pressure Transmitter
11ABI21RA	3419	ABPT0534	I	5.2.2	Steam Generator C Pressure Transmitter
11ABI21UA	3419	ABPT0544	I	5.2.2	Steam Generator D Pressure Transmitter
11ABK23AE	3419	ABHV0012, ABHV0015, ABHV0018, ABHV0021	C	5.2.3	MSIV Bypass Valves
11ABK23AF	3419	ABHS0080	C	5.2.3	MSIV and MSIV Bypass Valve Handswitch
11ABK23AG	3419	ABHY0012A ABHY0015A ABHY0018A ABHY0021A	C	5.2.3	MSIV Bypass Valves
11ABK28AH	3419	ABHV0014	C	5.2.4	Loop 1 Main Steam Iso Valve
11ABK28BH	3419	ABHV0020	C	5.2.4	Loop 3 Main Steam Iso Valve
11ABK29AH	3419	ABHV0017	C	5.2.4	Loop 2 Main Steam Iso Valve
11ABK29BH	3419	ABHV0011	C	5.2.4	Loop 4 Main Steam Iso Valve
11ABK30BB	3419	SA075A	P	5.2.4 5.2.6	125 VDC to MSFIS Cabinet SA075A from NK5119
11AEI08AB	3419	AELT0501	I	5.2.5	SG A Wide Range Level Transmitter
11AEI08BB	3419	AELT0529	I	5.2.5	SG B Narrow Range Level Transmitter
11AEI08CB	3419	AELT0539	I	5.2.5	SG C Narrow Range Level Transmitter
11AEI12AB	3419	AELT0551	I	5.2.5	SG A Narrow Range Level Transmitter

Table C-18-3
PFSSD Cables Located in Fire Area C-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11AEI12DB	3419	AELT0554	I	5.2.5	SG D Narrow Range Level Transmitter
11AEK16AH	3419	AEFV0039	C	5.2.6	Steam Generator A Feedwater Isolation Valve
11AEK16BH	3419	AEFV0041	C	5.2.6	Steam Generator C Feedwater Isolation Valve
11AEK17AH	3419	AEFV0040	C	5.2.6	Steam Generator B Feedwater Isolation Valve
11AEK17BH	3419	AEFV0042	C	5.2.6	Steam Generator D Feedwater Isolation Valve
11ALB01AB	3419	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AD	3419	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AG	3419	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AR	3419	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AS	3419	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AW	3419	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALG02BA	3419	ALHV0035	P	5.2.7	CST to MDAFP A Suction
11ALG02BB	3419	ALHV0035	C	5.2.7	CST to MDAFP A Suction
11ALG02CA	3419	ALHV0036	P	5.2.7	CST to TDAFP Suction
11ALG02CB	3419	ALHV0036	C	5.2.7	CST to TDAFP Suction
11ALG04BA	3419	ALHV0031	P	5.2.7	ESW to MDAFP A Suction
11ALG04BB	3419	ALHV0031	C	5.2.7	ESW to MDAFP A Suction
11ALG04BD	3419	ALHV0031	C	5.2.7	ESW to MDAFP A Suction
11ALG04CA	3419	ALHV0032	P	5.2.7	ESW A to TDAFP Suction
11ALG04CB	3419	ALHV0032	C	5.2.7	ESW A to TDAFP Suction
11ALG04CD	3419	ALHV0032	C	5.2.7	ESW A to TDAFP Suction
11ALI03AC	3419	ALHV0009	I	5.2.7	MDAFP A to SG B
11ALI03AD	3419	ALHV0009	I	5.2.7	MDAFP A to SG B

Table C-18-3
PFSSD Cables Located in Fire Area C-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ALI03AE	3419	ALHV0009	I	5.2.7	MDAFP A to SG B
11ALI03AF	3419	ALHV0009	I	5.2.7	MDAFP A to SG B
11ALI03BC	3419	ALHV0011	I	5.2.7	MDAFP A to SG C
11ALI03BD	3419	ALHV0011	I	5.2.7	MDAFP A to SG C
11ALI03BE	3419	ALHV0011	I	5.2.7	MDAFP A to SG C
11ALI03BF	3419	ALHV0011	I	5.2.7	MDAFP A to SG C
11ALI05AC	3419	ALHV0006	I	5.2.7	TDAFP to SG D
11ALI05AD	3419	ALHV0006	I	5.2.7	TDAFP to SG D (ALHY0006)
11ALI05AE	3419	ALHV0006	I	5.2.7	TDAFP to SG D
11ALI05AF	3419	ALHV0006	I	5.2.7	TDAFP to SG D
11ALI05BC	3419	ALHV0008	I	5.2.7	TDAFP to SG A
11ALI05BD	3419	ALHV0008	I	5.2.7	TDAFP to SG A (ALHY0008)
11ALI05BE	3419	ALHV0008	I	5.2.7	TDAFP to SG A
11ALI05BF	3419	ALHV0008	I	5.2.7	TDAFP to SG A
11ALI07JA	3419	ALPT0025	I	5.2.7	MDAFP A Suction Pressure
11ALI08AA	3419	ALPT0037	I	5.2.7	ESFAS AFW Low Suction Press Transmitter
11ALI09BA	3419	ALFT0009	I	5.2.7	Aux Feedwater Flow to SG B
11ALI09CA	3419	ALFT0011	I	5.2.7	Aux Feedwater Flow to SG C
11ALK01AA	3419	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALY09CD	3419	ALHV0009	C	5.2.7	MDAFP A to SG B
11ALY09DD	3419	ALHV0011	C	5.2.7	MDAFP A to SG C
11BBG03AA	3419	BBHV0013	P	5.2.21	RCP A Thermal Barrier Return Iso Valve
11BBG03AB	3419	BBHV0013	C	5.2.21	RCP A Thermal Barrier Return Iso Valve

Table C-18-3
PFSSD Cables Located in Fire Area C-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BBG03BA	3419	BBHV0014	P	5.2.21	RCP B Thermal Barrier Return Iso Valve
11BBG03BB	3419	BBHV0014	C	5.2.21	RCP B Thermal Barrier Return Iso Valve
11BBG03CA	3419	BBHV0015	P	5.2.21	RCP C Thermal Barrier Return Iso Valve
11BBG03CB	3419	BBHV0015	C	5.2.21	RCP C Thermal Barrier Return Iso Valve
11BBG03DA	3419	BBHV0016	P	5.2.21	RCP D Thermal Barrier Return Iso Valve
11BBG03DB	3419	BBHV0016	C	5.2.21	RCP D Thermal Barrier Return Iso Valve
11BBG39AC	3419	BBHV8000A	C	5.2.8	Pressure PORV BBPCV0455A Block Valve
11BBG39AF	3419	BBHV8000A	C	5.2.8	Pressure PORV BBPCV0455A Block Valve
11BBG39AJ	3419	BBHV8000A	C	5.2.8	Pressure PORV BBPCV0455A Block Valve
11BBI15EB	3419	BBPT0405	I	5.2.9	RCS Wide Range Hot Leg Pressure
11BBI15HB	3419	BBTE0413A	I	5.2.10	RCS Loop 1 Hot Leg Temp (WR)
11BBI15JB	3419	BBTE0423A	I	5.2.10	RCS Loop 2 Hot Leg Temp (WR)
11BBI15KB	3419	BBTE0443B	I	5.2.10	RCS Loop 4 Cold Leg Temp (WR)
11BBI15LB	3419	BBTE0433B	I	5.2.10	RCS Loop 3 Cold Leg Temp (WR)
11BBI16KB	3419	BBPT0455	I	5.2.2 5.2.8 5.2.44	Pressurizer Pressure Transmitter
11BBI16PB	3419	BBLT0459	I	5.2.11	Pressurizer Level Transmitter (NR)
11BBI28AA	3419	BBFT0017	I	5.2.21	BBHV0013 Flow Control
11BBI28BA	3419	BBFT0018	I	5.2.21	BBHV0014 Flow Control
11BBI28CA	3419	BBFT0019	I	5.2.21	BBHV0015 Flow Control
11BBI28DA	3419	BBFT0020	I	5.2.21	BBHV0016 Flow Control
11BBK30AA	3419	BBHV8001A	C	5.2.12	RX Vessel Head Vent Solenoid Vlv
11BBK40AK	3419	BBPCV0455A	C	5.2.8	Pressurizer PORV

Table C-18-3
PFSSD Cables Located in Fire Area C-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BBK40AL	3419	BBPCV0455A	P	5.2.8	Pressurizer PORV
11BBK40AM	3419	BBPCV0455A	C	5.2.8	Pressurizer PORV
11BBK40AN	3419	BBPCV0455A	P	5.2.8	Pressurizer PORV
11BGB01AB	3419	DPBG05A	C	5.2.13	Centrifugal Charging Pump A Motor
11BGG11BC	3419	BGHV8106	C	5.2.14	Charging Pumps To Regenerative HX Iso
11BGG11CA	3419	BGHV8110	P	5.2.13	CCP A Mini-Flow Valve
11BGG11CB	3419	BGHV8110	C	5.2.13	CCP A Mini-Flow Valve
11BGG11CC	3419	BGHV8110	C	5.2.13	CCP A Mini-Flow Valve
11BGG11CD	3419	BGHV8110	C	5.2.13	CCP A Mini-Flow Valve
11BGG12AA	3419	BGLCV0112B	P	5.2.15	VCT Outlet Valve
11BGG12AB	3419	BGLCV0112B	C	5.2.15	VCT Outlet Valve
11BGG12AC	3419	BGLCV0112B	C	5.2.15	VCT Outlet Valve
11BGG12AD	3419	BGLCV0112B	C	5.2.15	BNLCV0112D Interlock
11BGG12AE	3419	BGLCV0112B	C	5.2.15	SIS and Low-Low Level Interlock
11BGG52AA	3419	BGHV8357A	P	5.2.16	CCP A Discharge to RCP Seals
11BGG52AB	3419	BGHV8357A	C	5.2.16	CCP A Discharge to RCP Seals
11BGG52AC	3419	BGHV8357A	C	5.2.16	CCP A Discharge to RCP Seals
11BGI51AA	3419	BGFT0215A	I	5.2.16	RCP Seal Injection Total Flow Transmitter
11BGI51CA	3419	BGLT0112	I	5.2.15	VCT Level Transmitter
11BGK48DB	3419	BGHV8154A	C	5.2.17	Excess Letdown Iso Valve
11BNG01AA	3419	BNLCV0112D	P	5.2.18	RWST to CCP A Suction Valve
11BNG01AB	3419	BNLCV0112D	C	5.2.18	RWST to CCP A Suction Valve
11BNG01AC	3419	BNLCV0112D	C	5.2.18	RWST to CCP A Suction Valve

Table C-18-3
PFSSD Cables Located in Fire Area C-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BNG01AD	3419	BNLCV0112D	C	5.2.18	RWST to CCP A Suction Valve
11BNG03AA	3419	BNHV8812A	P	5.2.19	RWST to RHR A Suction Valve
11BNG03AB	3419	BNHV8812A	C	5.2.19	RWST to RHR A Suction Valve
11BNG03AC	3419	BNHV8812A	C	5.2.19	RWST to RHR A Suction Valve
11BNG03AE	3419	BNHV8812A	C	5.2.19	RWST to RHR A Suction Valve
11EFB01SA	3419	DPEF01A	C	5.2.20	Train A ESW Pump Motor
11EFB01SB	3419	DPEF01A	C	5.2.20	Train A ESW Pump Motor
11EFG02AC	3419	EFHV0023	C	5.2.20	ESW A/Service Water Cross Connect Valve
11EFG02AD	3419	EFHV0023	C	5.2.20	ESW A/Service Water Cross Connect Valve
11EFG02AE	3419	EFHV0023	C	5.2.20	ESW A/Service Water Cross Connect Valve
11EFG02AF	3419	EFHV0023	C	5.2.20	ESW A/Service Water Cross Connect Valve
11EFG02BC	3419	EFHV0024	C	5.2.20	ESW B/Service Water Cross Connect Valve
11EFG02BD	3419	EFHV0024	C	5.2.20	ESW B/Service Water Cross Connect Valve
11EFG02BE	3419	EFHV0024	C	5.2.20	ESW B/Service Water Cross Connect Valve
11EFG02BF	3419	EFHV0024	C	5.2.20	ESW B/Service Water Cross Connect Valve
11EFG03CC	3419	EFHV0041	C	5.2.20	ESW A To Service Water Iso Valve
11EFG03CD	3419	EFHV0041	C	5.2.20	ESW A To Service Water Iso Valve
11EFG03CE	3419	EFHV0041	C	5.2.20	ESW A To Service Water Iso Valve
11EFG03DC	3419	EFHV0042	C	5.2.20	ESW B To Service Water Iso Valve
11EFG03DD	3419	EFHV0042	C	5.2.20	ESW B To Service Water Iso Valve
11EFG03DE	3419	EFHV0042	C	5.2.20	ESW B To Service Water Iso Valve
11EFG04AA	3419	EFHV0059	P	5.2.20	Train A CCW Return to ESW UHS
11EFG04AB	3419	EFHV0059	C	5.2.20	Train A CCW Return to ESW UHS

Table C-18-3
PFSSD Cables Located in Fire Area C-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EFG06AC	3419	EFHV0037	C	5.2.20	ESW A To UHS
11EFG07AC	3419	EFHV0031	C	5.2.20	ESW A To CTMT Air Coolers Iso Valve
11EFG08AC	3419	EFHV0049	C	5.2.20	ESW A To CTMT Air Coolers Iso Valve
11EFG09AC	3419	EFHV0033	C	5.2.20	ESW A To CTMT Air Coolers Iso Valve
11EFG09CC	3419	EFHV0045	C	5.2.20	ESW A To CTMT Air Coolers Iso Valve
11EFI08RB	3419	EFPT0001	I	5.2.20	ESW Pump 1A Discharge Pressure
11EFI11EA	3419	EFFT0053	I	5.2.20	ESW A Flow To Power Block
11EGB01AB	3419	DPEG01A	C	5.2.21	CCW Pump A Motor
11EGB01AC	3419	DPEG01A	C	5.2.21	CCW Pump A Motor
11EGB01AD	3419	DPEG01A	C	5.2.21	CCW Pump A Motor
11EGB01AG	3419	DPEG01A	C	5.2.21	CCW Pump A Motor
11EGB01AK	3419	DPEG01A	C	5.2.21	CCW Pump A Motor
11EGB01CB	3419	DPEG01C	C	5.2.21	CCW Pump C Motor
11EGB01CC	3419	DPEG01C	C	5.2.21	CCW Pump C Motor
11EGB01CD	3419	DPEG01C	C	5.2.21	CCW Pump C Motor
11EGB01CG	3419	DPEG01C	C	5.2.21	CCW Pump C Motor
11EGG05AA	3419	EGHV0015	P	5.2.21	CCW A Pump Common Header Return Iso
11EGG05AB	3419	EGHV0015	C	5.2.21	CCW A Pump Common Header Return Iso
11EGG05CA	3419	EGHV0053	P	5.2.21	A Train CCW Supply To Nuclear Aux Comp.
11EGG05CB	3419	EGHV0053	C	5.2.21	A Train CCW Supply To Nuclear Aux Comp.
11EGG05CD	3419	EGHV0053	C	5.2.21	A Train CCW Supply To Nuclear Aux Comp.
11EGG07AA	3419	EGHV0101	P	5.2.22	CCW A to RHR A Heat Exchanger
11EGG07AB	3419	EGHV0101	C	5.2.22	CCW A to RHR A Heat Exchanger

Table C-18-3
PFSSD Cables Located in Fire Area C-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EGG09AC	3419	EGHV0058	C	5.2.21	CCW To RCS Iso Valve
11EGG09AD	3419	EGHV0058	C	5.2.21	CCW To RCS Iso Valve
11EGG09DA	3419	EGHV0061	P	5.2.21	CCW Return From RCS Iso Valve
11EGG09DB	3419	EGHV0061	C	5.2.21	CCW Return From RCS Iso Valve
11EGG17BA	3419	EGHV0132	C	5.2.21	Thermal Barrier CCW Return HV-62 By-Pass
11EGG17BB	3419	EGHV0132	C	5.2.21	Thermal Barrier CCW Return HV-62 By-Pass
11EGG18AC	3419	EGHV0126	C	5.2.21	CCW To RCS Iso Valve
11EGG18AD	3419	EGHV0126	C	5.2.21	CCW To RCS Iso Valve
11EGI19AB	3419	EGFT0128	I	5.2.21	CCW to RCP Flow Transmitter
11EGK16AA	3419	EGTV0029	C	5.2.21	CCW A Heat Exchanger Bypass Isolation Valve
11EGK16AC	3419	EGTV0029	C	5.2.21	CCW A Heat Exchanger Bypass Isolation Valve
11EJB01AB	3419	DPEJ01A	C	5.2.22	RHR Pump A Motor
11EJG04AA	3419	EJHV8804A	P	5.2.22	RHR A to CVCS CCP Isolation Valve
11EJG04AB	3419	EJHV8804A	C	5.2.22	RHR A to CVCS CCP Isolation Valve
11EJG05AC	3419	EJHV8701A	C	5.2.22	RCS Hot Leg 1 To RHR Pump A Suction
11EJG05AJ	3419	EJHV8701A	C	5.2.22	RCS Hot Leg 1 To RHR Pump A Suction
11EJG05BC	3419	EJHV8701B	C	5.2.22	RCS Hot Leg 4 To RHR Pump B Suction
11EJG05BJ	3419	EJHV8701B	C	5.2.22	RCS Hot Leg 4 To RHR Pump B Suction
11EJG06AC	3419	EJHV8811A	C	5.2.19	CTMT Recirc Sump To RHR Pump A
11EJG08AB	3419	EJFCV0610	C	5.2.22	RHR A Mini Flow Valve
11EJG08AC	3419	EJFCV0610	C	5.2.22	RHR A Mini Flow Valve
11EJG08AD	3419	EJFIS0610	C	5.2.22	RHR A Mini Flow Indicating Switch
11EJG08AE	3419	EJFCV0610	P	5.2.22	RHR A Mini Flow Valve

Table C-18-3
PFSSD Cables Located in Fire Area C-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EJG09CC	3419	EJHV8809A	C	5.2.22	RHR To Accum Inj Loops 1 & 2 Iso Vlv
11EJG09CD	3419	EJHV8809A	C	5.2.22	RHR To Accum Inj Loops 1 & 2 Iso Vlv
11EMB01AB	3419	DPEM01A	C	5.2.23	SI Pump A Motor
11EMG02AC	3419	EMHV8803A	C	5.2.24	Train A BIT Inlet Valve
11EMG02CF	3419	EMHV8801A	C	5.2.24	Train A BIT Outlet Valve
11EMK12BA	3419	EMHV8964	C	5.2.24	SI Test Line System Outside CTMT Iso Vlv
11ENB01AB	3419	DPEN01A	C	5.2.25	Containment Spray Pump A Motor
11ENG03AC	3419	ENHV0006	C	5.2.25	Containment Spray Pump A Isolation Valve
11ENG03AD	3419	ENHV0006	C	5.2.25	Containment Spray Pump A Isolation Valve
11EPG02AE	3419	EPHV8808A	C	5.2.26	Accumulator Tank A Outlet Iso Valve
11EPG02BE	3419	EPHV8808C	C	5.2.26	Accumulator Tank C Outlet Iso Valve
11GDG01AC	3419	DCGD01A	C	5.2.20	Train A ESW Pump Room Supply Fan Motor
11GDI04AA	3419	GDTE0001	I	5.2.20	ESW Pump Room A Temperature
11GDI04AB	3419	GDTZ0001A	I	5.2.20	Train A ESW Pump Room Inlet Damper
11GDI04AC	3419	GDTZ0001B	I	5.2.20	Train A ESW Pump Room Recirc Damper
11GDY01AA	3419	GDHIS0001A	C	5.2.20	ESW Pump Room A Supply Fan HIS
11GDY01AB	3419	GDHIS0001A	C	5.2.20	ESW Pump Room A Supply Fan HIS
11GFG01AC	3419	DSGF02A	C	5.2.7	AFW Pump A Room Cooler Motor
11GKG02AA	3419	SGK04A	P	5.2.27	Control Room A/C Unit A
11GKG02AE	3419	SGK04A	C	5.2.27	Control Room A/C Unit A
11GKG13AA	3419	SGK05A	P	5.2.28	Class 1E Electrical Equip Room A/C Unit A
11GKG13AB	3419	SGK05A	C	5.2.28	Class 1E Electrical Equip Room A/C Unit A
11GKG13AE	3419	SGK05A	C	5.2.28	Class 1E Electrical Equip Room A/C Unit A

Table C-18-3
PFSSD Cables Located in Fire Area C-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GKG13AF	3419	SGK05A	C	5.2.28	Class 1E Electrical Equip Room A/C Unit A
11GKG13AG	3419	SGK05A	C	5.2.28	Class 1E Electrical Equip Room A/C Unit A
11GKG13AH	3419	SGK05A	C	5.2.28	Class 1E Electrical Equip Room A/C Unit A
11GKG13AJ	3419	SGK05A	C	5.2.28	Class 1E Electrical Equip Room A/C Unit A
11GKY02AA	3419	GKHZ0029A/B	C	5.2.27	Control Room A/C Unit 4A Return and Supply Dampers
11GKY02AB	3419	GKHZ0029B	C	5.2.27	Control Room A/C Unit 4A Return Damper
11GKY02AC	3419	GKHZ0029A	C	5.2.27	Control Room A/C Unit 4A Supply Damper
11GKY02AD	3419	GKHZ0029A/B	C	5.2.27	Control Room A/C Unit 4A Return and Supply Dampers
11GKY02AE	3419	GKHZ0029A/B	P	5.2.27	Control Room A/C Unit 4A Return and Supply Dampers
11GKY02AF	3419	GKHZ0029A/B	P	5.2.27	Control Room A/C Unit 4A Return and Supply Dampers
11GLG05AA	3419	DSGL10A	P	5.2.22	RHR Pump A Room Cooler Fan Motor
11GLG05GA	3419	DSGL12A	P	5.2.13	CCP A Room Cooler Motor
11GLG06AD	3419	DSGL11A	C	5.2.21	CCW A Pump Room Cooler Motor
11GLY27AB	3419	GLHZ0080	C	5.2.21	CCW A Pump Room Cooler Exhaust Damper
11GLY27AD	3419	GLHZ0081	C	5.2.21	CCW A Pump Room Cooler Exhaust Damper
11GNG02AD	3419	DSGN01A	C	5.2.29	Containment Cooler Fan A Motor
11GNG02AH	3419	DSGN01A	C	5.2.29	Containment Cooler Fan A Motor
11GNG02AJ	3419	DSGN01A	C	5.2.29	Containment Cooler Fan A Motor
11GNG02AK	3419	DSGN01A	C	5.2.29	Containment Cooler Fan A Motor
11GNG02CD	3419	DSGN01C	C	5.2.29	Containment Cooler Fan C Motor
11GNG02CH	3419	DSGN01C	C	5.2.29	Containment Cooler Fan C Motor

Table C-18-3
PFSSD Cables Located in Fire Area C-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GNG02CJ	3419	DSGN01C	C	5.2.29	Containment Cooler Fan C Motor
11GNG02CK	3419	DSGN01C	C	5.2.29	Containment Cooler Fan C Motor
11GNI05AA	3419	GNPT0937	I	5.2.2	Containment Pressure Transmitter
11JEG01AD	3419	DPJE01A	C	5.2.42	Train A Emerg Fuel Oil Transfer Pump Motor
11KJK01AA	3419	KKJ01A	P	5.2.42	Train A Emergency Diesel Engine
11NBB01AB	3419	NBHS0010	C	5.2.31	NB01 Synchro-scope/Selector Switch
11NBB01AD	3419	NBHS0010	C	5.2.31	NB01 Synchro-scope/Selector Switch
11NBB01AE	3419	NBHS0010	C	5.2.31	NB01 Synchro-scope/Selector Switch
11NBB02AC	3419	NB00109	C	5.2.31	Bus NB01 Monitoring and Control
11NBB03BC	3419	NB00112	C	5.2.31	Bus NB01 Monitoring and Control
11NBB12AA	3419	NB00112	C	5.2.31	Bus NB01 Incoming Feeder Breaker DC Control
11NBB12AB	3419	NB00112	C	5.2.31	Bus NB01 Incoming Feeder Breaker DC Control
11NBB12AC	3419	NB00112	C	5.2.31	Bus NB01 Incoming Feeder Breaker DC Control
11NBB12AD	3419	NB00112	C	5.2.31	Bus NB01 Incoming Feeder Breaker DC Control
11NBB12AE	3419	NB00112	C	5.2.31	Bus NB01 Incoming Feeder Breaker DC Control
11NBB12AF	3419	NB00112	C	5.2.31	Bus NB01 Incoming Feeder Breaker DC Control
11NBB12AG	3419	NB00112	C	5.2.31	Bus NB01 Incoming Feeder Breaker DC Control
11NBB13AA	3419	NB00109	C	5.2.31	XNB02 to Bus NB01 Crosstie Feeder Breaker
11NBB13AC	3419	NB00109	C	5.2.31	XNB02 to Bus NB01 Crosstie Feeder Breaker

Table C-18-3
PFSSD Cables Located in Fire Area C-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11NBK13AA	3419	NB00117	P	5.2.31	NB01 Breaker DC Control Power
11NBK13AB	3419	NB00117	P	5.2.31	NB01 Breaker DC Control Power
11NEB10AA	3419	NB00111	C	5.2.42	EDG A to NB01 Feeder Breaker (NEHIS0025)
11NEB10AD	3419	NB00111	C	5.2.42	EDG A to NB01 Feeder Breaker (NEHIS0025)
11NEK12AA	3419	NE107	P	5.2.42	Train A Diesel Gen Exciter Control
11NFK01AA	3419	NF039C	P	5.2.30	Load Shed / Sequencer Ch 1 & 4 Term
11NFK01CA	3419	NF039A	C	5.2.30	Load Shed / Sequencer Ch 1 Logic
11NFK01DA	3419	NF039B	C	5.2.30	Load Shed / Sequencer Ch 4 Logic
11NFY01AA	3419	NF039A	P	5.2.30	Load Shed / Sequencer Ch 1 Logic
11NFY01BA	3419	NF039B	P	5.2.30	Load Shed / Sequencer Ch 4 Logic
11NFY01EA	3419	NF039A	C	5.2.30	Load Shed / Sequencer Ch 1 Logic
11NFY01FA	3419	NF039B	C	5.2.30	Load Shed / Sequencer Ch 4 Logic
11NGB10AB	3419	NB00113	C	5.2.32	NG01 Feeder Breaker (NGHIS0001)
11NGB10BB	3419	NB00110	C	5.2.32	NG03 Feeder Breaker (NGHIS0002)
11NGB10SA	3419	NB00116	C	5.2.32	NG05E Feeder Breaker (NGHIS0003)
11NGG01AD	3419	NG001B	P	5.2.32	NG01B Incoming Power Feed from NG0107
11NGG01AE	3419	NG001B	P	5.2.32	NG01B Incoming Power Feed from NG0107
11NGG01AJ	3419	NG001TAF1	P	5.2.32	NG01T Incoming Power Feed from NG0108
11NGG01BB	3419	NG003CAF1	P	5.2.32	NG03C Incoming Power Feed from NG0306
11NGG01BC	3419	NG003CAF1	P	5.2.32	NG03C Incoming Power Feed from NG0306
11NGG01BF	3419	NG003TAF1	P	5.2.32	NG03T Incoming Power Feed from NG0305
11NGG11AA	3419	NG00101	C	5.2.32	Bus NG01 Feeder Breaker Control (NGHIS0009)

Table C-18-3
PFSSD Cables Located in Fire Area C-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11NGG11BA	3419	NG00301	C	5.2.32	Bus NG03 Feeder Breaker Control (NGHIS0011)
11NGK11AA	3419	NG00101	P	5.2.32	Bus NG01 125 VDC Breaker Control Power
11NGK11AB	3419	NG00101	P	5.2.32	Bus NG01 125 VDC Breaker Control Power
11NGK11BA	3419	NG00301	P	5.2.32	Bus NG03 125 VDC Breaker Control Power
11NGK11BB	3419	NG00301	P	5.2.32	Bus NG03 125 VDC Breaker Control Power
11NNG01AA	3419	NN11	P	5.2.33	480 VAC Power to Inverter NN11
11NNG01CA	3419	NN13	P	5.2.33	480 VAC Power to Inverter NN13
11NNK01JA	3419	NN15	P	5.2.33	125 VDC Power to Swing Inverter NN15
11NNK01JB	3419	NN15	P	5.2.33	125 VDC Power to Swing Inverter NN15
11NNY01EA	3419	NN11	P	5.2.33	120 VAC Power from NN15 to NN11
11NNY01EB	3419	NN11	P	5.2.33	120 VAC Power from NN15 to NN11
11PKK10AA	3419	PK21	C	5.2.32	Train A 125 VDC Non-Class 1E Battery Chgr
11PKK10AB	3419	PK21	C	5.2.32	NG0102 Breaker Control
11PNG01AD	3419	PN07	P	5.2.34	Non-Class 1E Electrical Equipment AC Distribution Panel
11PNG01AE	3419	PN07	P	5.2.34	Non-Class 1E Electrical Equipment AC Distribution Panel
11QBY03CA	3419	CR Standby Lights	C	5.2.35	Control Room Standby Lighting
11QDK01AA	3419	QD01, QD02, QD03, QD04, QD05, QD06	P	5.2.35	Control Room Emergency Lights
11RLK01AA	3419	NK04119	P	5.2.36	125 VDC to RC & Support Sys Control Panel (RL001/RL002)
11RLK01CA	3419	NK04112	P	5.2.36	125 VDC to ESF Control Panel (RL017/RL018)
11RLK01DA	3419	NK04113	P	5.2.36	125 VDC to ESF Control Panel (RL019/RL020)

Table C-18-3
PFSSD Cables Located in Fire Area C-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11RLK01EA	3419	NK05109	P	5.2.36	125 VDC to Reactor Auxiliary Control Panel (RL021/RL022)
11RPK09AA	3419	NK04122	P	5.2.20	125 VDC to Auxiliary Relay Rack RP139
11RPK09CA	3419	NK05113	P	5.2.3 5.2.37	125 VDC to Auxiliary Relay Rack RP209
11RPY09CA	3419	RP053AC	P	5.2.38	120 VAC to BOP Instrumentation Rack from NN0116
11RPY09DA	3419	RP053AC	P	5.2.38	120 VAC to BOP Instrumentation Rack from NN0120
11RPY10BA	3419	RP068	P	5.2.20	120 VAC to BOP Control Panel from NG01ACR1
11SAK21AA	3419	SA036A	P	5.2.7	125 VDC to ESFAS Channel 1 Termination Cab from NK5110
11SAY21AA	3419	SA036A	P	5.2.7	120 VAC to ESFAS Channel 1 Termination Cab from NN0103
11SAZ19KA	3419	SGK05A	C	5.2.28	Status Panel SA066A Input from SGK05A
11SBS01AD	3419	SB029A	P	5.2.39	120 VAC to SSPS A Input Panel from NN0110
11SBS02AD	3419	SB032A	P	5.2.39	120 VAC to SSPS B Input Panel from NN0109
11SBS05AE	3419	SB029D	P	5.2.39	120 VAC to SSPS A Output Panel from NN0112
11SBS05AF	3419	SB029D	P	5.2.39	125 VDC to SSPS A Output Panel from NK4118
11SBS10AB	3419	SB102A	P	5.2.39	125 VDC to Reactor Trip Switchgear A from NK4116
11SBS12AC	3419	SB102A	C	5.2.39	Reactor Trip Switchgear A
11SBY09CA	3419	SB038	P	5.2.39	120 VAC to Process Protection Set 1 Panel from NN0111

Table C-18-3
PFSSD Cables Located in Fire Area C-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11SES01AA	3419	SE054A	P	5.2.40	120 VAC to Nuclear Instrumentation Sys Rack 1 Panel from NN0113
11SES07BA	3419	SENY0060B	P	5.2.40	120 VAC to Source Range Monitor from NN0107
11SES07BB	3419	SENY0060B	I	5.2.40	Source Range Monitor
11SES07CA	3419	SENY0060A	P	5.2.40	120 VAC to Source Range Monitor from NN0105
15BBA01AC	3419	DPBB01A	C	5.2.43	Reactor Coolant Pump A Motor
15BBA01BC	3419	DPBB01B	C	5.2.43	Reactor Coolant Pump B Motor
15BBI19AA	3419	BBPCV0455B	I	5.2.44	Pressurizer Spray Valve
15BBI19BA	3419	BBPCV0455C	I	5.2.44	Pressurizer Spray Valve
15BGK10AA	3419	BGLCV0459	C	5.2.41	Letdown Isolation Valve
15BGK10AD	3419	BGLCV0459	C	5.2.41	Letdown Isolation Valve
15BGK10BA	3419	BGLCV0460	C	5.2.41	Letdown Isolation Valve
15BGK10BD	3419	BGLCV0460	C	5.2.41	Letdown Isolation Valve
15BGK35AB	3419	BGHV8149A	C	5.2.41	Letdown Orifice Isolation Valve
15BGK35AD	3419	BGHV8149A	C	5.2.41	Letdown Orifice Isolation Valve
15BGK35BB	3419	BGHV8149B	C	5.2.41	Letdown Orifice Isolation Valve
15BGK35BD	3419	BGHV8149B	C	5.2.41	Letdown Orifice Isolation Valve
15BGK35CB	3419	BGHV8149C	C	5.2.41	Letdown Orifice Isolation Valve
15BGK35CD	3419	BGHV8149C	C	5.2.41	Letdown Orifice Isolation Valve
15BMK06AB	3419	BMHV0001	C	5.2.37	SG A to Blowdown Flash Tank Isolation Valve
15BMK06BB	3419	BMHV0002	C	5.2.37	SG B to Blowdown Flash Tank Isolation Valve
15BMK06CB	3419	BMHV0003	C	5.2.37	SG C to Blowdown Flash Tank Isolation Valve

Table C-18-3
PFSSD Cables Located in Fire Area C-18

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15BMK06DB	3419	BMHV0004	C	5.2.37	SG D to Blowdown Flash Tank Isolation Valve
15BMK16AA	3419	BM157	P	5.2.37	125 VDC to Blowdown Control Panel from PK5123
15EJI12AA	3419	EJHCV0606	I	5.2.22	RHR A Heat Xchgr Discharge Control Valve
15EMK05EA	3419	EMHV8882	C	5.2.24	Boron Injection Downstream Test Line Iso Vlv
15FCY35AA	3419	FC169A	P	5.2.45	Steam Generator Feed Pump A Term Cabinet
15GKK31CA	3419	95XGK07	C	5.2.28	SGK05A Fire Signal Isolation
15GKK31CB	3419	95XGK07	C	5.2.28	SGK05A Fire Signal Isolation
15NBA10AA	3419	NB00112	C	5.2.31	Bus NB01 Incoming Feeder Breaker Control
15NBA10AD	3419	NB00112	C	5.2.31	Bus NB01 Incoming Feeder Breaker Control
15NBB03AJ	3419	XNB01	P	5.2.31	XNB01 Differential Relay (MA104F)
15PGA10AA	3419	PA0105	C	5.2.46	Load Centers PG11, PG13 and PG25 Fdr Bkr
15PGA10BA	3419	PA0106	C	5.2.46	Load Centers PG15, PG17 and PG19 Fdr Bkr
15PGA10BB	3419	PA0106	C	5.2.46	Load Centers PG15, PG17 and PG19 Fdr Bkr
15PGG13DA	3419	PG1901	C	5.2.46	Bus PG19 Feeder Breaker
15PGG13DC	3419	PG1901	C	5.2.46	Bus PG19 Feeder Breaker
15PNY01AR	3419	PG019GFR3	P	5.2.34	XPN07D Instrumentation Bus XFMR-Alt Supply
15RLY01DA	3419	PN00736	P	5.2.22	120 VAC to ESF Control Panel (RL017/RL018)
15RLY01EA	3419	PN00738	P	5.2.10	120 VAC to Reactor Auxiliary Control Pnl (RL021/RL022)
15RPK09EA	3419	PK05129	P	5.2.37	125 VDC to Auxiliary Relay Rack RP211
15RPK09NA	3419	PK05126	P	5.2.28	125 VDC to Reverse Isolation Relay Rack RP330

5.2.1 Steam Generator Atmospheric Relief Valves

PFSSD requires at least two steam generator atmospheric relief valves (ARVs) be controlled and the other two closed. The ARVs are pneumatically operated using air from the compressed air system (KA) or nitrogen from the nitrogen accumulators. The valves open by pneumatic pressure and close by spring action. The valves are automatically controlled by a pressure transmitter input signal from a pressure transmitter installed on the outlet side of the steam generator. Alternatively, each valve can be controlled manually from the control room or the auxiliary shutdown panel by placing the pressure indicating controller (PIC) in manual.

As discussed in Section 5.2.7, a fire in area C-18 could damage cables and equipment associated with the Train A Motor Driven Auxiliary Feedwater Pump (MDAFP). The Turbine Driven Auxiliary Feedwater Pump (TDAFP) and the Train B MDAFP are available. The TDAFP can be lined up to feed steam generators B and C while the Train B MDAFP can be used to supply auxiliary feedwater to Steam Generators A and D.

Cables associated with steam generator A ARV ABPV0001 are run in this area. Damage to these cables could prevent control or isolation of the ARV. A single open ARV is bounded by the main steamline break analysis. If necessary, ABPV0001 can be failed closed by isolating air and nitrogen to the valve using KAV1435 (air) and KAV1364 (nitrogen) then venting air from the regulator. These valves are located in area A-23 and emergency lighting is available.

Cables associated with ARVs ABPV0002 (SG B), ABPV0003 (SG C) and ABPV0004 (SG D) do not run through fire area C-18. Therefore, these three ARVs can be controlled from the control room.

Based on the above discussion, PFSSD can be achieved by controlling ARVs ABPV0002, ABPV0003 and ABPV0004 and locally isolating ARV ABPV0001. The TDAFP can be used to supply steam generators B and C the Train B MDAFP can be used to supply steam generator D.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB20A, E-1F9101, J-110-00216, J-110-00217, M-12AB01, M-12KA04, M-12KA05

5.2.2 Safety Injection and Containment Spray

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. A spurious containment spray actuation signal (CSAS) could cause the containment spray pumps to operate, depleting inventory in the RWST. These conditions are not desirable for PFSSD at Wolf Creek.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a

single steam generator line. Low pressure on a single pressure transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Containment spray (CS) is initiated automatically by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937.

Cables associated with steamline pressure transmitters ABPT0514, ABPT0524, ABPT0534 and ABPT0544, pressurizer pressure transmitter BBPT0455 and containment pressure transmitter GNPT0937 run in area C-18. Cables for the remaining components associated with SIS and CSAS do not run in area C-18. Consequently, a spurious SIS or CSAS cannot occur due to a fire in area C-18.

References: E-15000, XX-E-013, E-13AB21, E-13BB16, E-13GN05, E-1F9431, E-1F9432, E-1F9433, M-12AB01, M-12BB02, M-12GN01

5.2.3 Steam Generator Main Steam Isolation Bypass Valves

Each of the four Steam Generator Main Steam Isolation Valve (MSIV) bypass valves (ABHV0012, ABHV0015, ABHV0018 and ABHV0021) has two redundant solenoids that control the position of the associated bypass valve. The bypass valves are normally closed with the solenoids de-energized. Both solenoids need to be energized to open the valve. One of the solenoids on each valve is on separation group 1 (Train A) and are controlled by handswitch ABHS0080. The other solenoids on each valve are on separation group 4 (Train B) and are controlled by handswitch ABHS0079.

Cable 11ABK23AE is associated with steam line isolation signal relay K627. Upon receipt of a steam line isolation signal, the relay contact opens and the bypass valves close. An open circuit in one of the two conductors will produce the same result as a steam line isolation signal, which is desired for PFSSD. A hot short between the conductors will bypass the contact and prevent a steam line isolation signal from closing the valves.

Cable 11ABK23AF is associated with handswitch ABHS0080 on the Train A MSIV bypass valve control circuit. An open circuit in one of the two conductors will de-energize the respective solenoid and close the bypass valves. A hot short between the conductors will bypass the handswitch contact and prevent closure of the valves using the handswitch.

Cable 11ABK23AG is associated with MSIV bypass valves ABHV0012, ABHV0015, ABHV0018 and ABHV0021. The bypass valves are normally closed, which is the desired PFSSD position. In order for the valves to spuriously open, both solenoids on the air line need to be energized. An external cable hot short on cable 11ABK23AG could energize the Train A solenoids but the Train B solenoids are unaffected by a fire in area C-18. In addition, hand switch ABHS0079 is available to ensure the bypass valves are closed. Therefore, a fire in area C-18 will not affect the ability to isolate the MSIV bypass valves.

Cable 11RPK09CA supplies 125 VDC to relay panel RP209 from NK5113 and energizes the Train A control circuit for all four MSIV bypass valves. Damage to this cable will result in a loss of power to the control circuit and fail all four MSIV bypass valves closed, which is the desired PFSSD position.

Redundant means are available to ensure the MSIV bypass valves are closed. Handswitch ABHS0079 is unaffected by the fire and can be used to ensure one of the two solenoids on each bypass valve is de-energized.

References: E-15000, XX-E-013, E-093-00048, E-13AB23A, E-13AB23B, E-13RP09, E-1F9101, M-12AB02

5.2.4 Steam Generator Main Steam Isolation Valves (MSIVs)

PFSSD requires the MSIVs be closed to prevent reactivity addition due to uncontrolled cooldown. The MSIVs are closed from the control room using all close hand switches ABHS0079 or ABHS0080.

Each MSIV is designed to utilize system fluid (main steam) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main steam. This is done by actuating either all close hand switch ABHS0079 (separation group 4) or ABHS0080 (separation group 1) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MSIV	ABHS0079 (Sep Group 4)		ABHS0080 (Sep Group 1)	
	Solenoids	Cable	Solenoids	Cable
ABHV0011	MV2, MV4, MV6	14ABK28BH	MV1, MV3, MV5	11ABK29BH
ABHV0014	MV2, MV4, MV6	14ABK29AH	MV1, MV3, MV5	11ABK28AH
ABHV0017	MV2, MV4, MV6	14ABK28AH	MV1, MV3, MV5	11ABK29AH
ABHV0020	MV2, MV4, MV6	14ABK29BH	MV1, MV3, MV5	11ABK28BH

All 4 cables associated with the 12 separation group 1 solenoid valves are run in area C-18. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 4 cables associated with hand switch ABHS0079 are unaffected by a fire in area C-18. Therefore, hand switch ABHS0079 is available to close the four MSIVs.

Cable 11ABK30BB provides 125 VDC power to Train A main steam and feedwater isolation system (MSFIS) actuation cabinet SA075A from NK5119. Damage to this cable would disrupt power to the separation group 1 solenoids and close the MSIVs, which is the desired PFSSD position. In addition, the Train B MSFIS is unaffected by the fire and ABHS0079 is unaffected by the fire and is available to close the MSIVs.

Based on the above discussion, hand switch ABHS0079 is available to close the MSIVs in the event of a fire in area C-18.

References: E-15000, XX-E-013, E-13AB23A, E-13AB23B, E-13AB26, E-13AB27, E-13AB28, E-13AB29, E-1F9101, J-104-00295, J-104-00296, M-12AB02

5.2.5 Steam Generator Level Indication

The decay heat removal function for PFSSD requires the use of two RCS loops and two Steam Generators. Steam generator (SG) level indication is required to support this function. A fire in area C-18 credits MDAFP B supplying SG D and the TDAFP supplying either SG B or C. As discussed in Section 5.2.1, steam generator A ARV ABPV0001 control could be lost.

Cables associated with SG level transmitters AELT0501 (SG A WR), AELT0551 (SG A NR), AELT0529 (SG B NR), AELT0539 (SG C NR) and AELT0554 (SG D NR) are run in area C-18. Damage to these cables due to a fire will prevent indication on the associated level indicators in the control room. Alternate level indication remains available on all four SGs using the following level indicators:

Steam Generator	Available Level Indication
A	AELI0517 (NR), AELI0518 (NR), AELI0519 (NR)
B	AELI0502 (WR), AELI0527 (NR), AELI0528 (NR), AELI0552 (NR)
C	AELI0503 (WR), AELI0537 (NR), AELI0538 (NR), AELI0553 (NR)
D	AELI0504 (WR), AELI0547 (NR), AELI0548 (NR), AELI0549 (NR)

Based on the above discussion, level indication on all four steam generators is assured if a fire occurs in area C-18.

References: E-15000, XX-E-013, E-13AE08, E-13AE12, E-1F9203, M-12AE02

5.2.6 Steam Generator Main Feedwater Isolation Valves

PFSSD requires that either the main feedwater isolation valves (MFIVs) be closed or the main feedwater pumps be stopped to prevent overfilling the steam generators. Flow diversion from auxiliary feedwater (AFW) to the main feedwater system piping is prevented by check valves AEV0420, AEV0421, AEV0422 and AEV0423. Closure of the main feedwater isolation valves is not required to prevent AFW flow diversion.

Each MFIV is designed to utilize system fluid (feedwater) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main feedwater. This is done by actuating either all close hand switch AEHS0080 (separation group 1) or AEHS0081 (separation group 4) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MFIV	AEHS0080 (Sep Group 1)		AEHS0081 (Sep Group 4)	
	Solenoids	Cable	Solenoids	Cable
AEFV0039	MV1, MV3, MV5	11AEK16AH	MV2, MV4, MV6	14AEK17AH
AEFV0040	MV1, MV3, MV5	11AEK17AH	MV2, MV4, MV6	14AEK16AH
AEFV0041	MV1, MV3, MV5	11AEK16BH	MV2, MV4, MV6	14AEK17BH
AEFV0042	MV1, MV3, MV5	11AEK17BH	MV2, MV4, MV6	14AEK16BH

All 4 cables associated with the 12 separation group 1 solenoid valves are run in area C-18. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 4 cables associated with hand switch AEHS0081 are unaffected by a fire in area C-18. Therefore, hand switch AEHS0081 is available to close the four MFIVs.

Cable 11ABK30BB provides 125 VDC power to Train A main steam and feedwater isolation system (MSFIS) actuation cabinet SA075A from NK5119. Damage to this cable would disrupt power to the separation group 1 solenoids and close the MFIVs, which is the desired PFSSD position. In addition, the Train B MSFIS is unaffected by the fire and AEHS0081 is available to close the MFIVs.

Based on the above discussion, MFIV isolation is assured using hand switch AEHS0081.

References: E-15000, XX-E-013, E-13AE14, E-13AE15, E-13AE16, E-13AE17, E-1F9201, J-104-00295, J-104-00296, M-12AE02

5.2.7 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire AFW demand to achieve cold shutdown.

Motor operated valves (MOVs) in the system allow operators to line up the auxiliary feedwater system as required to achieve and maintain safe shutdown. Damage to the MOV circuits due to a fire could prevent operators from lining up the system from the control room.

Several PFSSD cables associated with various components of the auxiliary feedwater system (AL) run through fire area C-18. These cables are identified in Table C-18-3. All cables are associated with Train A (separation group 1). There are no Train B (separation group 4) cables associated with the AFW system running through area C-18.

Damage to the Train A cables listed in Table C-18-3 could prevent operation of Train A MDAFP. However, Train B MDAFP and the TDAFP are unaffected by a fire in area C-18. The suction source to the Train B MDAFP is available from the CST and Train B ESW. The suction source to the TDAFP is available from Train B ESW only. The TDAFP is available to supply AFW to steam generators B and C but the capability of the TDAFP to supply steam generators A and D could be affected.

Condensate storage tank pressure transmitters ALPT0037, ALPT0038 and ALPT0039 are included in the PFSSD design because they initiate swapover to ESW upon 2/3 low CST pressure indications. Panels SA036A, SA036B and SA036C monitor pressure transmitter signals on ALPT0037, ALPT0039 and ALPT0038, respectively. A spurious low CST pressure due to fire damage to cables associated with two of these pressure transmitters could swap the water source to ESW. This is only a commercial concern and should be prevented if possible.

Cable 11ALI08AA is an instrument cable associated with ALPT0037. Cables associated with the remaining two pressure transmitters are not run in C-18. Therefore, swapover to ESW due to spurious low CST pressure is not feasible if a fire occurs in this area.

Cable 11SAK21AA supplies 125 VDC power to panel SA036A from NK5110. Cable 11SAY21AA supplies 120 VAC power to panel SA036A from NN0103. Damage to these cables could result in a loss of power to the panel and could prevent automatic operation of Train A low suction pressure (LSP) swapover. Power cables associated with LSP signals controlled by panels SA036B and SA036C are unaffected by a fire in this area.

Based on the above discussion, auxiliary feedwater is assured if a fire occurs in fire area C-18 using Train B MDAFP supplying auxiliary feedwater to steam generators A and D and the TDAFP supplying AFW to steam generators B and C. However, as discussed in Section 5.2.1, steam generator A ARV could be affected. Therefore, the assured method to achieve PFSSD if a fire occurs in this area is the Train B MDAFP supplying steam generator D and the TDAFP supplying steam generators B and C.

References: E-15000, XX-E-013, E-13AL01A, E-13AL01B, E-13AL02A, E-13AL02B, E-13AL03A, E-13AL03B, E-13AL04A, E-13AL04B, E-13AL05A, E-13AL05B, E-13AL07A, E-13AL08, E-13AL09, E-13GF01, E-13SA21, E-1F9202, E-1F9203, E-1F9204, E-1F9402A, E-1F9402B, E-1F9444, J-10SA, M-12AL01, M-12GF01

5.2.8 Pressurizer PORVs and Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed. Cables and components associated with PORV BBPCV0455A and associated block valve BBHV8000A are run through area C-18. Cables and components associated with PORV BBPCV0456A and associated block valve BBHV8000B are not located in area C-18.

The pressurizer PORVs are not considered high/low pressure interfaces. The valves are supplied power by an ungrounded 125 VDC system. Therefore, based on GL 86-10, consideration of multiple proper polarity hot shorts is not required. A single proper polarity hot short still needs to be considered.

If a fire causes BBPCV0455A to open and damages BBHV8000A cables, Operators can close BBPCV0455A by placing hand switch BBHIS0455A, located on RL021, in the close position. Pressurizer level and RCS pressure indication are available to diagnose a failed open PORV using BBLI0460A and BBPI0406, respectively. In addition, pressurizer pressure indication is available using BBPI0456, BBPI0457 and BBPI0458.

Instrument cable 11BBI16KB associated with pressurizer pressure transmitter BBPT0455 is run in fire area C-18. Damage to this cable could send a spurious high-pressure signal to the pressurizer master controller. However, as discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure channel will not cause the spurious operation of the pressurizer PORVs.

Based on the above discussion, pressurizer PORV BBPCV0455A could spuriously open due to damage to the PORV control cables and valve BBHV8000A may not close due to cable damage. The PORV can be closed using hand switch BBHIS0455A in the main control room.

References: E-15000, XX-E-013, E-13BB16, E-13BB39, E-13BB40, E-1F9301, M-12BB02, M-744-00028, OFN KC-016, CR 13079, DCP 12944, DCP 13324

5.2.9 Reactor Coolant System (RCS) Pressure Indication

The PFSSD design requires RCS pressure indication to be available. RCS pressure indication is provided in the control room using BBPI0405 or BBPI0406. Cable 11BBI15EB, associated with BBPT0405, runs through fire area C-18 and could be damaged by a fire.

Redundant RCS pressure transmitter BBPT0406 is unaffected by a fire in area C-18. Therefore, RCS pressure indication is available using BBPI0406.

References: E-15000, XX-E-013, E-13BB15, E-13BB16, E-1F9201, E-1F9205, M-12BB04

5.2.10 RCS Hot and Cold Leg Temperature Elements

PFSSD requires RCS hot and cold leg temperature indication on at least one loop to verify flow through the steam generators. The temperature elements used for this purpose are listed in the following table.

As identified in Table C-18-3, cables associated with RCS temperature elements BBTE0413A, BBTE0423A, BBTE0433B and BBTE0443B are run in area C-18. A fire could damage these cables and cause temperature indication on the four temperature elements to be unavailable. Consequently, temperature indication on at least one leg on each loop could be lost, which is not in accordance with the PFSSD methodology at Wolf Creek.

RCS Hot and Cold Leg Temperature Elements Used for PFSSD	
COMPONENT	**FUNCTION**
BBTE0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	RCS Cold Leg Temperature Element (WR) Loop 4

Cable 15RLY01EA supplies 120 VAC power from PN0738 to RL021/RL022. The power splits at RL021/RL022 and supplies power to temperature recorder BBTR0423 as well as some non-PFSSD components. This temperature recorder provides indication of RCS hot and cold leg temperature on loop 2.

Procedure EMG ES-04, Attachment B Section B1 provides alternate indication in the control room that may be used to verify natural circulation flow. One of these methods verifies that steam generator pressure is stable or decreasing. Based on Sections 5.2.1 and 5.2.7, cooldown can be performed using loops 2, 3 and 4. Based on Section 5.2.2, S/G B pressure instruments ABPT0525 and ABPT0526; S/G C pressure instruments ABPT0535 and ABPT0536; and S/G D pressure instruments ABPT0545 and ABPT0546 are unaffected by a fire in C-18. These pressure instruments, along with their respective indicators in the control room, can be used, per EMG ES-04, to verify heat removal in loops 2, 3 and 4.

The configuration is acceptable because, in the event of a fire in area C-18, cooldown can be performed using RCS loops 2, 3 and 4. The associated indicating devices for RCS wide range hot and cold leg temperature elements (BBTE0423B, BBTE0433A and BBTE0443A) as well as ABPT0525, ABPT0526, ABPT0535, ABPT0536, ABPT0545 and ABPT0546 will provide indication of flow through the steam generators.

References: E-15000, XX-E-013, E-13BB15, E-13RL01, E-13RL06, E-1F9201, M-12AB01, M-12BB01, EMG ES-04

5.2.11 Pressurizer Level Transmitters

PFSSD requires pressurizer level indication to be available. Pressurizer level indication is provided by level transmitters BBLT0459 and BBLT0460. A cable associated with BBLT0459 runs through area C-18 and could be damaged, causing inoperability of BBLT0459 and its associated level indicator (BBLI0459A). Cables for BBLT0460/BBLI0460A do not run through fire area C-18.

Pressurizer level indication is available using BBLT0460/BBLI0460A if a fire occurs in area C-18.

References: E-15000, XX-E-013, E-13BB16, E-1F9301, M-12BB02

5.2.12 Reactor Head Vent Valves

PFSSD requires that one of the two reactor vessel head vent valves on each flow path (2 flow paths total) be closed to prevent uncontrolled depressurization of the RCS. Either BBHV8001A or BBHV8002A and either BBHV8001B or BBHV8002B needs to be closed.

A cable associated with head vent valve BBHV8001A runs through C-18. Cables for the remaining valves are unaffected. Therefore, the reactor head vent flow path will remain isolated throughout the event.

References: E-15000, XX-E-013, E-1F9301, E-13BB30, M-12BB04

5.2.13 Centrifugal Charging System

At least one centrifugal charging pump (CCP) is required for PFSSD to provide RCP seal cooling, reactivity control and inventory control. These functions are accomplished using a CCP taking suction from the refuelling water storage tank (RWST) and injecting through the RCP seals. RCP seal injection provides approximately 20 gpm makeup to the RCS and provides adequate boron concentration to maintain sub-critical reactivity conditions. If RCP seal injection is unavailable, reactivity and inventory control is provided by lining up the CCPs to the boron injection tank (BIT). The normal charging pump (NCP) is not credited and is assumed lost.

A control cable associated with Train A Centrifugal Charging Pump (CCP) runs through area C-18. Damage to this cable could prevent operation of the pump. Redundant Train B CCP cables are run in a separate fire area and are unaffected by a fire in this area. Therefore, PFSSD is assured using Train B CCP if a fire occurs in area C-18.

Power and control cables associated with Train A CCP miniflow valve BGHV8110 are run through area C-18. Redundant Train B cables for miniflow valve BGHV8111 are run in a different area and are unaffected by a fire in area C-18. Therefore, PFSSD is assured using Train B CCP miniflow valve if a fire occurs in area C-18.

The power cable associated with Train A CCP room cooler motor DSGL12A runs in area C-18. Damage to this cable will prevent operation of the room cooler. Train B CCP room cooler SGL12B circuits do not run in area C-18 and are unaffected by a fire. Therefore, Train B CCP room cooler will be available.

Based on the above discussion, the Train A CCP could be affected but the Train B CCP is available if a fire occurs in area C-18.

References: XX-E-013, E-15000, E-13BG01, E-13BG11B, E-13GL05, E-1F9102, E-1F9302, E-1F9401A, E-1F9444, M-12BG03, M-12GL01

5.2.14 Charging Flow to Regenerative Heat Exchanger Isolation Valves

PFSSD requires charging flow to be directed to the RCP seals. To ensure adequate flow to RCP seals, flow diversion to the regenerative heat exchanger needs to be prevented. Valves BGHV8105 and BGHV8106 are included in the PFSSD design to accomplish this task. Manual valve BG8402B is also included to provide an alternate means of closing this flow path if either BGHV8105 or BGHV8106 are unavailable, and is also used during alternate safe shutdown per OFN RP-017.

Cables associated with BGHV8106 are run in area C-18 and could be damaged by a fire, preventing valve BGHV8106 from being closed from the control room. Cables associated with redundant valve BGHV8105 do not run in area C-18. Consequently, valve BGHV8105 can be isolated from the control room if a fire occurs in area C-18.

References: E-15000, XX-E-013, E-13BG11A, E-1F9102, E-1F9302, M-12BG03

5.2.15 Volume Control Tank (VCT)

Power and control cables associated with VCT valve BGLCV0112B run through fire area C-18. Cables for redundant VCT valve BGLCV0112C are run in a separate fire area and are unaffected by a fire in area C-18. The PFSSD position of these valves is at least one closed. Therefore, PFSSD can be accomplished by isolation of BGLCV0112C.

A hot short involving cables 11BGG12AD and 11BGG12AE could bypass the BNLCV0112D interlock as well as the SIS and VCT low-low level interlocks and cause inadvertent closure of BGLCV0112B. If this occurs prior to establishing suction from the RWST, damage to the operating charging pump could occur due to loss of suction. The assumptions in calculation XX-E-013 state that systems and components are in their normal operating position or status prior to the fire. The Normal Charging Pump (NCP) is the normally operated pump and is assumed to be operating at the time of the fire. Inadvertent closure of valve BGLCV0112B with no suction from the RWST would result in damage to the NCP but the centrifugal charging pumps would remain unaffected. As stated in 5.2.13, the A Train CCP could be unavailable but the B Train CCP is unaffected by the fire.

A cable (11BGI51CA) associated with VCT level transmitter BGLT0112 runs through area C-18. A false low-low level signal associated with this level transmitter could initiate refueling water sequence, which is the desired PFSSD lineup. Damage to this cable could also cause a spurious VCT level indication on BGLI0112 in the control room. Cables associated with BGLT0185 are unaffected by the fire and BGLI0185 will provide reliable level indication in the control room.

Based on the above discussion, a fire in area C-18 that affects components associated with the VCT will not adversely impact the ability to achieve and maintain PFSSD.

References: XX-E-013, E-15000, E-13BG12, E-13BG12A, E-13BG51, E-13BN01, E-1F9102, E-1F9302, M-12BG03

5.2.16 RCP Seal Injection

PFSSD requires RCP seal injection to provide a boron injection path, provide makeup to the RCS and provide cooling to the RCP seals. The redundant boron injection and makeup path is through the boron injection tank (BIT). The redundant seal cooling method uses thermal barrier cooling.

Power and control cables associated with RCP seal injection flow throttling valve BGHV8357A are run in area C-18. Damage to these cables will prevent operation of the valve from the control room. PFSSD requires RCP seal injection using an available centrifugal charging pump and flowing through the associated throttling valve. Cables associated with redundant Train B valve BGHV8357B are run in a separate fire area and are unaffected by a fire in area C-18.

Cable 11BGI51AA is associated with RCP seal total flow transmitter BGFT0215A. Damage to this cable could prevent operation of the flow transmitter and could prevent operators from determining total RCP seal flow using flow indicator BGFI0215A. Flow indicator BGFI0215B is unaffected by a fire in area C-18 and can be used by operators to determine if seal flow is functioning.

Based on the above discussion, PFSSD is assured using Train B charging pump and aligning RCP seal injection flow through BGHV8357B. Operators can use flow indicator BGFI0215B to diagnose a loss of RCP seal injection in the event of a loss of the operating charging pump. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-13BG51, E-13BG52, E-1F9102, E-1F9302, M-12BG03

5.2.17 Excess Letdown

PFSSD requires the excess letdown path be isolated to prevent uncontrolled depressurization of the RCS. To accomplish this, either normally closed valve BGHV8153A or BGHV8154A must be maintained closed and either normally closed valve BGHV8153B or BGHV8154B must be maintained closed.

One cable associated with BGHV8154A runs through fire area C-18. The remaining valves are unaffected since their cables do not run through this area. Therefore, the remaining valves are unaffected by a fire in area C-18 and will remain closed.

References: E-15000, XX-E-013, E-13BG48, E-1F9301, M-12BG01

5.2.18 Refueling Water Storage Tank (RWST) to Charging Pumps Suction Isolation Valves

Cables associated with RWST to CCP A valve BNLCV0112D run through fire area C-18. As stated earlier, the Train A CCP may not be available if a fire occurs in area C-18. Therefore, the Train B CCP is used, taking suction from the RWST. Cables associated with valve BNLCV0112E are unaffected by a fire in area C-18. Therefore, BNLCV0112E can be opened from the control room to provide the necessary suction from the RWST to the Train B CCP.

A fire in area C-18 will use CCP B taking suction from the RWST through valve BNLCV0112E.

References: E-15000, XX-E-013, E-13BN01, E-1F9102, E-1F9302, M-12BN01

5.2.19 Refueling Water Storage Tank (RWST) and Containment Sump Isolation Valves

To prevent draindown of the RWST into the containment sump, PFSSD requires that either valve BNHV8812A or valve EJHV8811A and valve BNHV8812B or valve EJHV8811B be closed during hot standby. For cold shutdown, the operating train containment sump valve (EJHV8811A or EJHV8811B) must be maintained closed to prevent flow diversion from the RCS to the containment sump. Valves BNHV8812A and BNHV8812B are normally open and valves EJHV8811A and EJHV8811B are normally closed.

Power and control cables for valve BNHV8812A run through fire area C-18. Damage to these cables could prevent closing this valve from the control room or could cause the valve to spuriously close. In addition, cable damage could prevent the valve from automatically closing when valve EJHV8811A reaches full open position.

A control cable (11EJG06AC) associated with valve EJHV8811A runs through fire area C-18. Damage to this cable will not result in valve EJHV8811A opening as long as valve BNHV8812A remains open. If valve BNHV8812A is fully closed, it will provide a permissive for valve EJHV8811A to open. If valve EJHV8811A opens due to damage to cable 11EJG06AC, draindown will not occur since valve BNHV8812A is closed.

Based on the above discussion, draindown of the RWST to the containment sump is not credible if a fire occurs in area C-18.

References: E-15000, XX-E-013, E-13BN03, E-13BN03A, E-13EJ06A, E-13EJ06B, E-1F9102, E-1F9205, M-12BN01, M-12EJ01, M-10BN

5.2.20 Essential Service Water System

One train of Essential Service Water (ESW) is required to be operable to ensure adequate cooling for essential equipment. A number of cables associated with Train A ESW components are run in this area. Therefore, Train A ESW cannot be relied on for PFSSD if a fire occurs in this area. Cables associated with Train B ESW are run in a different fire area. Therefore, Train B ESW is available if a fire occurs in area C-18.

Valve EFHV0023 is a normally open isolation valve on the service water system feed to the Train A Essential Service Water System. Either this valve or valve EFHV0025 is required to be closed when operating the Train A ESW system for PFSSD. Power and control cables associated with EFHV0023 are run in this area. Damage to these cables could prevent closing EFHV0023 from the control room. Redundant valve EFHV0025 is unaffected by a fire in area C-18 and can be closed from the control room to isolate this flowpath. In addition, check valve EFV0470 is installed in this line and will prevent flow diversion in the unlikely event valve EFHV0025 cannot be closed.

Valve EFHV0024 is a normally open isolation valve on the service water system feed to the Train B Essential Service Water System. Either this valve or valve EFHV0026 is required to be closed when operating the Train B ESW system for PFSSD. Power and control cables associated with EFHV0024 are run in this area. Damage to these cables could prevent closing EFHV0024 from the control room. Redundant valve EFHV0026 is unaffected by a fire in area C-18 and can be closed from the control room to isolate this flowpath. In addition, check valve EFV0471 is installed in this line and will prevent flow diversion in the unlikely event valve EFHV0026 cannot be closed.

Valve EFHV0041 is a normally open isolation valve on the return line from the Train A Essential Service Water System to the service water system. Either this valve or valve EFHV0039 is required to be closed when operating the Train A ESW system for PFSSD. Power and control cables associated with EFHV0041 are run in this area. Damage to these

cables could prevent closing EFHV0041 from the control room. Redundant valve EFHV0039 is unaffected by a fire in area C-18 and can be closed from the control room to isolate this flowpath.

Valve EFHV0042 is a normally open isolation valve on the return line from the Train B Essential Service Water System to the service water system. Either this valve or valve EFHV0040 is required to be closed when operating the Train B ESW system for PFSSD. Power and control cables associated with EFHV0042 are run in this area. Damage to these cables could prevent closing EFHV0042 from the control room. Redundant valve EFHV0040 is unaffected by a fire in area C-18 and can be closed from the control room to isolate this flowpath.

Valve EFHV0037 is the Train A return isolation valve from ESW to the Ultimate Heat Sink. This valve is required to be open when operating the Train A ESW system for PFSSD. A cable (11EFG06AC) associated with this valve is run in this area and damage could cause the valve to spuriously close. Circuits for redundant Train B valve EFHV0038 are not run in area C-18 and will be unaffected by the fire.

Cable 11GDI04AA provides ESW A room temperature from temperature element GDTE0001 to temperature controller GDTC0001. Cables 11GDI04AB and 11GDI04AC provide signals from GDTC0001 to outside air intake damper GDTZ0001A and recirculation damper GDTZ0001B, respectively, to change position based on room temperature. Damage to these cables could prevent operation of the dampers. Temperature controls for Train B ESW pump room are unaffected by a fire in area C-18.

Cable 11RPY10BA supplies 120 VAC control power to the automatic and manual start circuits in panel RP068 from NG01ACR1 for Train A ESW pump room supply fan CGD01A. Cables 11GDY01AA and 11GDY01AB are associated with the Train A ESW pump room supply fan CGD01A control circuit. Damage to these cables could prevent operation of the unit, which could prevent continuous operation of the Train A ESW pump. If this occurs, the Train B ESW pump room supply fan is unaffected by the fire.

Cable 11GDG01AC is associated with the indicator lights on Train A ESW pump room supply fan CGD01A hand switch GDHIS0001B. Damage to this cable could prevent operation of the fan. Cables for Train B ESW pump room supply fan CGD01B are unaffected by a fire in this area.

Cable 11RPK09AA supplies class 1E 125 VDC power from NK4122 to certain relays in panel RP139. These relays (1XEF31, 1XEF33 and 1XEF35) are associated with Train A ESW Pump. Damage to this cable could prevent operation of the Train A ESW pump.

PFSSD is assured for a fire in area C-18 using Train B ESW pump PEF01B and associated components.

References: E-15000, XX-E-013, E-093-00052, E-093-00053, E-13EF02, E-13EF03, E-13EF04, E-13EF06, E-13EF07, E-13EF08, E-13EF09, E-13RP09, E-13RP10, E-13EF11, E-K3EF08, E-K3GD01, E-K3GD04, E-1F9402A, E-1F9402B, E-1F9403, E-1F9424A, E-1F9443, E-K3EF01, J-201-00139, M-12EF01, M-12EF02, M-K2EF01, M-K2GD01

5.2.21 Component Cooling Water

For PFSSD, the component cooling water (CCW) system is used to provide cooling to the centrifugal charging pump (CCP) oil cooler, the RHR heat exchanger and the RHR pump seal cooler. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling. Cables associated with Train A CCW pumps PEG01A and PEG01C are run in this area. In addition, cables associated with Train A CCW pump room cooler SGL11A and associated dampers are run in this area. Damage to these cables could prevent operation of the Train A CCW system.

Cables associated with a number of valves in the Train A CCW system are run in area C-18. These cables and associated valves are listed in Table C-18-3. Cables associated with valves in the Train B CCW system do not run in area C-18 and are unaffected by a fire in this area.

Valves BBHV0013, BBHV0014, BBHV0015, BBHV0016, EGHV0058, EGHV0061, EGHV0126 and EGHV0132 provide isolation capability for CCW flow to/from the RCP thermal barriers. Cables associated with these components are located in area C-18. If the valves fail to the open position, CCW would continue to flow to the RCP components, including the thermal barrier. This continued flow of water will not adversely impact PFSSD. If the valves fail to the closed position, CCW flow to the thermal barrier could be lost. This is acceptable since RCP seal injection is available.

Flow transmitters BBFT0017, BBFT0018, BBFT0019 and BBFT0020 are associated with valves BBHV0013, BBHV0014, BBHV0015 and BBHV0016, respectively. The flow transmitters monitor flow in the CCW piping and shut the valves on high CCW flow. Cables associated with these flow transmitters are run in this area. Damage to these cables could cause a spurious high CCW flow signal and close the valves. Damage to the valve cables could prevent re-opening the valves.

Cable 11EGI19AB is associated with CCW to RCP flow transmitter EGFT0128. Damage to this cable could prevent operators from diagnosing a loss of CCW flow to the RCP thermal barriers using flow indicator EGFI0128. CCW to RCP flow indicator EGFI0129 is unaffected by a fire in area C-18 and can be used to diagnose a loss of CCW flow to the RCP thermal barriers.

Based on the above discussion, a fire in area C-18 could affect CCW flow to/from the RCP thermal barriers. The Train B CCW system is available to supply cooling to the remaining Train B PFSSD components. Loss of CCW flow to the RCP thermal barriers can be diagnosed using flow indicator EGFI0129. RCP seal injection is unaffected.

References: E-15000, XX-E-013, E-13BB03, E-13BB28, E-13EG01A, E-13EG01B, E-13EG05A, E-13EG05B, E-13EG07, E-13EG09, E-13EG09A, E-13EG16, E-13EG17A, E-13EG18, E-13EG19, E-13GL06, E-13GL27, E-1F9303, E-1F9401A, E-1F9444, M-12EG01, M-12EG02, M-12EG03, M-12GL01

5.2.22 Residual Heat Removal System

PFSSD requires one train of residual heat removal (RHR) to be available for shutdown cooling. The RHR system is not used for hot standby. A number of cables associated with the RHR system run in area C-18. These cables are discussed in the following paragraphs.

Valve EGHV0101 is the Train A CCW to RHR Heat Exchanger control valve. Valve EGHV0102 is the Train B CCW to RHR Heat Exchanger control valve. These valves are normally closed during power operation. PFSSD requires that the valve on the operating train of CCW be closed until shutdown cooling mode is entered, at which time the valve on the operating train of RHR needs to be open. Cables 11EGG07AA and 11EGG07AB are power and control cables associated with valve EGHV0101. Damage to these cables would not cause the spurious opening of the valve but could prevent operation when lining up for shutdown cooling. Valve EGHV0102 is unaffected by a fire in this area.

Cable 11EJB01AB is a control cable associated with Train A RHR pump feeder breaker NB00101. Damage to this cable could prevent operation of the pump from the control room or could cause the pump to spuriously operate. If the pump fails to operate, the Train B RHR pump is available. If the pump spuriously operates with no suction source, it will likely become damaged and the Train B RHR system will be used.

Cables 11EJG04AA and 11EJG04AB are power and control cables, respectively, associated with normally closed valve EJHV8804A. This valve is required to remain closed when aligning Train A RHR for cold shutdown. For hot standby, the valve can be in any position. Based on a review of the schematic diagram, damage to these cables will not cause the valve to spuriously open. Since this valve is not a high-low pressure interface boundary, consideration of a three-phase cable-to-cable hot short is not required. Train B valve EJHV8804B is unaffected by a fire in area C-18.

Cables associated with normally closed valves EJHV8701A (Train A) and EJHV8701B (Train B) run in area C-18. These valves are required to be open when aligning the respective RHR Train for cold shutdown. Cable damage could prevent opening the associated valve from the control room. Therefore, a fire in area C-18 may require a cold shutdown repair to be made within 72 hours per 10CFR50, Appendix R or a containment entry to manually open EJHV8701B when using RHR Train B.

Cables associated with Train A RHR pump mini-flow valve EJFCV0610 are run in area C-18. The mini-flow valve protects the Train A RHR pump during low-flow in the system. Damage to the cables could prevent operation of the valve. Cables associated with Train B RHR mini-flow valve EJFCV0611 do not run in area C-18. Therefore, the Train B RHR pump mini-flow valve is unaffected by a fire in area C-18.

The RHR pump discharge to RCS cold leg isolation valve (EJHV8809A or EJHV8809B) needs to be open on the operating train. Damage to cables 11EJG09CC and 11EJG09CD would likely result in valve EJHV8809A remaining in its as-is normally open position, which is the preferred PFSSD position. However, two proper intra-cable hot shorts in cable 11EJG09CD or one intra-cable hot short in cable 11EJG09CD combined with a short to ground on conductor 31 would spuriously close the valve.

Cable 11GLG05AA is the power cable for the RHR A room cooler SGL10A. Damage to this cable will prevent the RHR A room cooler from operating, and could impair the Train A RHR system. The B Train RHR room cooler is unaffected by a fire in area C-18.

Cable 15EJI12AA is an instrument AC power cable associated with Train A RHR flow control valve EJHCV0606. Cable 15RLY01DA supplies 120 VAC power from PN00736 to RL017/RL018, where the power splits and feeds EJHCV0606 via cable 15EJI12AA. Damage

to these cables will cause a loss of power to the valve controller, failing the valve open, which is the desired position if using Train A RHR. Train B RHR flow control valve EJHCV0607 is unaffected by a fire in this area.

Based on the above discussion, a number of Train A RHR components could be affected by a fire in area C-18 but Train B RHR is unaffected.

References: E-15000, XX-E-013, E-13EG07, E-13EJ01, E-13EJ04A, E-13EJ04B, E-13EJ05A, E-13EJ05B, E-13EJ08, E-13EJ09A, E-13EJ12, E-13GL05, E-13RL01, E-13RL04, E-1F9205, E-1F9301, E-1F9401A, E-1F9444, M-12EJ01, M-12GL01

5.2.23 Safety Injection Pumps

The PFSSD strategy is to prevent operation of the Safety Injection (SI) pumps to ensure an adequate supply of borated water in the RWST. One cable (11EMB01AB) associated with Train A SI pump is run in area C-18. Damage to this cable could cause the spurious start of the pump and could prevent stopping the pump from the control room.

If the Train A SI pump spuriously starts with the reactor at normal pressure, PFSSD will be assured. The pump will not discharge into the RCS due to the pressure differential between the RCS (approximately 2,235 psig) and the SI pump shutoff pressure (approximately 1,565 psig). In addition, the setpoint of the discharge relief valve (EM8853A) to the Recycle Holdup Tank is 1,825 psig. Therefore, no inventory will be lost from the RWST if the SI pumps spuriously start. With the SI pump operating at zero flow, damage to the pump could occur, which is a commercial concern only since the SI pump is not credited in the PFSSD analysis. If necessary, the pump can be stopped by opening breaker NB0103, but this action is not required for PFSSD.

Based on the above discussion, spurious operation of the Train A SI pump will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13EM01, E-1F9102, E-1F9302, M-12EM01, M-721-00096, WCRE-01

5.2.24 Boron Injection Tank Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

A fire in area C-18 uses CCP B, since circuits and support systems for CCP A may be affected by the fire. Also, based on the discussion in 5.2.41, a fire in area C-18 has the possibility to cause a momentary loss of inventory through the letdown flow path until the letdown isolation valves close automatically or are failed closed.

Cables 11EMG02AC, associated with EMHV8803A, and 11EMG02CF, associated with EMHV8801A, are run in this area. Cable 11EMG02CF is fire resistive and not susceptible to fire induced damage. Damage to cable 11EMG02AC could prevent opening valve EMHV8803A and could prevent a flowpath from Train A CCP to the RCS via the BIT.

Redundant Train B valve EMHV8803B is unaffected by a fire in this area so the Train B CCP flowpath to the RCS via the BIT is available.

To prevent CCP flow diversion through the SIS test line when charging through the BIT, valves EMHV8843 and EMHV8882 need to be closed. If either or both of these valves cannot be closed, then closing or maintaining closed either valve EMHV8871 or EMHV8964 will accomplish the PFSSD objective.

Cable 11EMK12BA is a control cable for EMHV8964. A hot short in cable 11EMK12BA will energize the solenoid and open valve EMHV8964. The cable is run in raceways with cables carrying the proper voltage and polarity for a cable-to-cable hot short. The hot short would bypass the control room handswitch (EMHIS8964) on RL017 and control of this valve from the control room would be lost.

Cable 15EMK05EA is a control cable associated with EMHV8882. A hot short in cable 15EMK05EA will energize the solenoid and open valve EMHV8882. The cable is run in raceways with cables carrying the proper voltage and polarity for a cable-to-cable hot short. The hot short would bypass the control room handswitch (EMHIS8882) on RL018 and control of this valve from the control room would be lost.

Redundant valve EMHV8871 is unaffected by the fire and is available to ensure the SIS test line remains isolated. Therefore, a fire in area C-18 will not adversely impact the ability to isolate the SIS test line flow path.

Based on the above discussion, charging through the BIT is unaffected by a fire in this area using Train B CCP and valves EMHV8801B and EMHV8803B. The SI test line can be isolated using valve EMHV8871.

References: E-15000, XX-E-013, E-13EM02, E-13EM02A, E-13EM02B, E-13EM02C, E-13EM05A, E-13EM12, E-1F9302, M-12EM01, M-12EM02

5.2.25 Containment Spray Pumps

Spurious start of the containment spray (CS) pumps may complicate PFSSD due to the possible depletion of inventory in the RWST. Therefore, a spurious start of the CS pumps should be avoided or mitigated. A control cable (11ENB01AB) associated with Train A CS pump PEN01A runs through area C-18 and could cause a spurious start of the pump if damaged. The cable damage could prevent stopping the pump from the control room.

Normally closed valve ENHV0006 could open due to damage to associated control cables. If this occurs, water would flow from the containment spray nozzles, depleting inventory in the RWST.

The total flow in the containment spray system during injection phase with one pump operating is 3,165 gpm (M-10EN). Based on calculation XX-E-013, Appendix 1, a maximum of 214,260 gallons of water can be lost from the RWST to maintain sufficient volume to achieve cold shutdown.

Level indication in the RWST is available, so operators have the ability to diagnose a reducing RWST inventory. The time available to mitigate containment spray is:

214,260 gallons / 3,165 gpm = 67.7 minutes

A fire in this area could also result in the inability to isolate letdown, as discussed in Section 5.2.41. The maximum inventory loss through letdown is 195 gpm through all three orifice valves. If a multiple spurious operation scenario exists where containment spray spuriously

operates concurrent with failed open letdown valves, the available time to mitigate this condition is as follows:

3,165 gpm + 195 gpm = 3,360 gpm

At this flowrate, the amount of time available to mitigate RWST inventory loss is:

214,260 gallons / 3,360 gpm = 63.7 minutes

Based on the above discussion, there is 63.7 minutes available to mitigate containment spray. Pump PEN01A can be stopped by opening breaker NB0102 in fire area C-9. This is an OMA. Refer to E-1F9900 for details. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 16.

References: XX-E-013, E-15000, E-13EN01, E-13EN03, E-1F9102, E-1F9302, E-1F9424A, E-1F9433, M-10BG, M-10EN, M-12EN01, M-721-00093

5.2.26 Safety Injection Accumulator Isolation Valves

PFSSD requires isolation of the SI accumulators prior to reducing RCS pressure below the injection pressure to avoid unnecessary accumulator discharge. This is accomplished by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. These valves are normally open with the MCC breaker administratively locked in the open position. Cables for valves EPHV8808A and EPHV8808C are run in area C-18.

Since the breakers for these valves are normally open, damage to these cables will not cause the valves to spuriously change position. However, damage to the cables will prevent closing the associated valve from the control room after power is restored.

The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig. If necessary, a containment entry can be made to manually close the valves.

References: E-15000, XX-E-013, M-12EP01, E-13EP02A, E-1F9201, CKL EP-120

5.2.27 Control Room Air Conditioning

Cables associated with Train A control room A/C unit SGK04A are run in this area. Damage to these cables could prevent operation of this unit. Cables associated with Train B control room A/C unit SGK04B are run in a separate area. Therefore, the Train B control room A/C unit is unaffected by a fire in this area.

Power and control cables associated with Train A Control Room A/C unit supply and return dampers GKHZ0029A and GKHZ0029B are run in area C-18. Damage to these cables could prevent operation of the associated dampers. Circuits for Train B Control Room A/C unit dampers do not run in area C-18.

Based on the above discussion, Control Room environmental conditions will be unaffected by a fire in area C-18.

References: XX-E-013, E-15000, E-13GK02A, E-13GK02B, E-13GK02C, E-1F9442, M-12GK01

5.2.28 Class 1E Electrical Equipment Room A/C Unit

Power and control cables associated with Train A class 1E Electrical Equipment room A/C unit SGK05A are run in area C-18. A fire could damage these circuits and prevent operation of the unit. Circuits for Train B class 1E Electrical Equipment A/C unit SGK05B do not run in area C-18.

Cable 11SAZ19KA associated with SGK05A is run in fire area C-18. Damage to this cable could prevent operation of SGK05A. Cables associated with SGK05B are unaffected by a fire in area C-18.

Cables 15GKK31CA and 15GKK31CB are associated with the fire isolation signal on SGK05A. Damage to these cables could cause the unit to stop and prevent a re-start. Cable 15RPK09NA is the power cable from PK5126 to separation group 5 relays in RP330. Damage to this cable could cause a loss of power to relay 95XGK07 and shut down SGK05A. Fire isolation signal cables associated with Train B class 1E A/C unit SGK05B are unaffected.

Based on the above discussion, Train B class 1E electrical equipment room cooling is available and is unaffected by a fire in area C-18.

References: XX-E-013, E-15000, E-13GK13, E-13GK31, E-13RP09, E-13SA19, E-1F9444, M-12GK03, M-622.1A-00002

5.2.29 Containment Coolers

PFSSD requires containment cooling to maintain the containment environment within EQ limits. Cables associated with Train A containment coolers are run in area C-18. Damage to these cables could prevent operation of the Train A containment coolers if a fire occurs in this area. Circuits for the Train B containment coolers are run in a separate fire area and are unaffected by a fire in area C-18.

As discussed earlier, Train B ESW is available if a fire occurs in area C-18. Therefore, the Train B containment coolers will have the necessary service water flow to ensure proper operation.

References: E-15000, XX-E-013, E-13GN02, E-13GN02A, E-1F9441, M-12GN01

5.2.30 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

Cables 11NFK01CA and 11NFK01DA associated with one of the four undervoltage relays on each bus run in area C-18. Also, cables 11NFY01EA and 11NFY01FA associated with the

degraded voltage PTs on each bus are run in fire area C-18. Cables associated with the remaining UV relays and PTs do not run in fire area C-18. Therefore, automatic functioning of the bus NB01 and NB02 emergency load shed/sequencer is unaffected by a fire in area C-18 due to the availability of at least two UV relay inputs.

Separation group 1 power supply cables for load shedder/sequencer logic and input cabinets NF039A, NF039B and NF039C run in area C-18. Damage to these cables could cause a loss of separation group 1 DC and AC power to the panels. Redundant separation group 3 and Train B DC and AC power is unaffected by a fire in area C-18.

Based on the above discussion, the load shedder/sequencer is not adversely affected by a fire in area C-18.

References: XX-E-013, E-15000, E-11NB01, E-11NB02, E-12NF01, E-13NF01, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, E-1F9402A, E-1F9402B, E-1F9403, E-1F9425, E-1F9426

5.2.31 Train A Class 1E 4.16 kV ESF Switchgear Bus NB01

Several cables associated with Class 1E 4.16 kV switchgear bus NB01 are located in this area. Damage to these cables could prevent operation of Train A equipment powered by NB01. Cables associated with class 1E 4.16 kV switchgear bus NB02 are located in a different fire area and are unaffected by a fire in area C-18.

References: XX-E-013, E-15000, E-13NB01, E-13NB02, E-13NB03, E-13NB10, E-13NB12, E-13NB13, E-13NG01A, E-1F9423, E-1F9425

5.2.32 Train A 480 VAC Load Centers

Cables associated with 480 VAC load centers NG01, NG03 and motor control center (MCC) NG05E are run in area C-18. Damage to these cables could de-energize the load centers and MCCs, preventing operation of the associated Train A equipment.

Cables 11PKK10AA and PKK10AB are associated with the 125 VDC control circuit for breaker NG0102, which supplies 480 VAC power to battery charger PK021. Damage to these cables could prevent closing NG0102 and supplying power to PK021. Battery charger PK022 is unaffected by a fire in this area.

Train B 480 VAC load centers NG02, NG04 and MCC NG06E are unaffected by a fire in this area and are available to supply power to redundant Train B equipment. Therefore, a fire in area C-18 will not impact the ability to supply power to required Train B 480 VAC equipment.

References: XX-E-013, E-15000, E-13NG01A, E-13NG10, E-13NG11, E-13PK10, E-1F9423, E-1F9424A, E-1F9424B, E-1F9424C, E-1F9424D, E-K3NG10

5.2.33 Class 1E 120 VAC Electrical Distribution System

The Class 1E 120 VAC electrical distribution system provides power to vital instrumentation and control loads for shutdown and normal operation. Under normal conditions, the system is supplied by inverters connected to the 125 VDC NK battery system. Swing inverters allow the primary inverters to be taken out of service for maintenance or repair without disrupting power to the associated vital AC bus. In the event of a loss of power to the inverters, a backup source of power is automatically lined up. The backup power source originates from the 480 VAC electrical distribution system (NG).

Cable 11NNG01AA supplies 480 VAC power from NG01ACR3 to inverter NN11. Cable 11NNG01CA supplies 480 VAC power from NG01AGF3 to inverter NN13. Damage to these cables will disrupt the 480 VAC power source to inverters NN11 and NN13. The 480 VAC power supply to swing inverter NN15 is unaffected.

Cables 11NNK01JA and 11NNK01JB supply 125 VDC power from NK0103 to manual transfer switch NK79. Damage to these cables will disrupt the 125 VDC power supply from NK0103 to swing inverter NN15. The 125 VDC power supply from NK0303 to swing inverter NN15 is unaffected.

Cables 11NNY01EA and 11NNY01EB supply 120 VAC power from swing inverter NN15 to bus NN01 through a manual transfer switch in inverter NN11. Damage to these cables will disrupt the 120 VAC power supply from swing inverter NN15 to NN01. The 120 VAC power supply from inverter NN11 to bus NN01 is unaffected.

As stated in Section 5.2.32, a fire in area C-18 could cause a loss of Train A 480 VAC power. This would cause a loss of 480 VAC power to the Train A NK battery chargers (NK21, NK23 and NK25) which will cause a loss of normal power to the NK01 and NK03 busses. Batteries NK11 and NK13 are unaffected and can supply 125 VDC to busses NK01 and NK03 to provide power to inverters NN11 and NN13 for a limited time.

Train B vital 120 VAC distribution panels NN02 and NN04 are unaffected by a fire in area C-18. Therefore, in the event of a loss of Train A Class 1E 120 VAC electrical distribution system, the Train B Class 1E electrical distribution switchboards are available to supply redundant PFSSD loads.

Based on the above discussion, damage to cables and components associated with Train A vital 120 VAC distribution panels NN01 and NN03 will not adversely impact the ability to achieve and maintain safe shutdown in the event of a fire in area C-18.

References: XX-E-013, E-15000, E-11NK01, E-13NN01, E-1F9421

5.2.34 Non-Class 1E 120 VAC Electrical Distribution System

The PFSSD function of the non-Class 1E 120 VAC electrical distribution system is to supply 120 VAC power to Main Control Boards (MCBs) RL017/RL018 and RL021/RL022. The power is split at the MCB to supply specific PFSSD components.

The PFSSD components that depend on non-class 1E 120 VAC power from RL017/RL018 are Residual Heat Removal (RHR) discharge valves EJHCV0606 (Train A) and EJHCV0607 (Train B). Non-class 1E switchboard panel PN07 supplies power from switch PN0736 to valve positioner EJHY0606. Valve positioner EJHY0606 controls the position of EJHCV0606 using hand controller EJHIC0606. Non-class 1E switchboard panel PN08 supplies power from switch PN0833 to valve positioner EJHY0607. Valve positioner EJHY0607 controls the position of EJHCV0607 using hand controller EJHIC0607.

The PFSSD components that depend on non-class 1E 120 VAC power from RL021/RL022 are temperature recorders BBTR0423, BBTR0433 and BBTR0443. Non-class 1E switchboard panel PN07 supplies power from switch PN0738 to temperature recorder BBTR0423. Non-class 1E switchboard panel PN08 supplies power from switch PN0835 to temperature recorders BBTR0433 and BBTR0443.

Cables 11PNG01AD and 11PNG01AE supply 480 VAC power from NG01BEF4 to 480/120V transformer XPN07A. Damage to either of these cables due to a fire in area C-18 will result in a loss of power to the transformer and loss of 120 VAC feed to PN07 from this power source.

Cable 15PNY01AR provides an alternate power feed to switchboard PN07 from PG19GFR3. Damage to this cable will result in a loss of the alternate power feed to PN07. The primary source of power to PN07 from transformer XPN07A could also be affected due to the loss of NG01, as discussed in Section 5.2.32. Therefore, PN07 may not be available if a fire occurs in this area.

Switchboard PN08 is unaffected by a fire in this area. Therefore, power to PFSSD loads supplied by PN08 is available. Loss of PN07 will have no adverse impact on PFSSD due to the availability of PN08.

References: XX-E-013, E-15000, E-13PN01, E-13PN01A, E-13RL04, E-13RL06, E-1F9201, E-1F9205, E-1F9421, E-1F9424E

5.2.35 Control Room Emergency Lights

Emergency lighting is provided in the control room to ensure adequate lighting during a station blackout and in the event a fire damages cables associated with the normal and standby lighting system. Emergency lights are supplied power from Class 1E 125 VDC breaker NK5120.

The control room has four sources of lighting; 1) Normal (QA); 2) Standby (QB); 3) Emergency (QD); and 4) Self-contained battery units. The normal lighting system is not evaluated in the PFSSD analysis and is assumed lost.

The control building standby lighting system is powered by the Train A 480 VAC Class 1E electrical system through breakers NG01AHF1 and NG01AHF2. Power availability on NG01AHF1 and NG01AHF2 is monitored by auxiliary relays 27XQB1 and 27XQB2 in panel RP330. Upon loss of power to both NG01AHF1 and NG01AHF2, the relay coils are de-energized and the normally open contacts close. This energizes the contactor control relay which closes a contact and energizes the control room emergency lighting panel NK051A, which automatically illuminates the 125 VDC (QD System) emergency lights in the control room.

Cable 11QBY03CA is a control cable that runs from NK051 to RP330 and provides control power to energize the contactor control relay to illuminate control room emergency lights upon loss of Class 1E power. A short in this cable due to a fire will illuminate emergency lights in the control room even though Class 1E power is available. This will have no impact on PFSSD.

An open in cable 11QBY03CA will prevent the control room emergency lights from illuminating upon loss of Class 1E power. Based on Calculation XX-E-013, Appendix 2, a fire in area C-18 can result in the loss of Train A off-site power and Train A emergency diesel generator. Therefore, the possibility exists for a fire in area C-18 to result in a loss of normal, standby and emergency lighting in the control room.

Cable 11QDK01AA is a 125 VDC power cable that runs from NK051A to the control room emergency lights. Damage to this cable will prevent operation of the emergency lights.

Self-contained Appendix R battery units are provided in the control room to provide minimum lighting for post-fire safe shutdown. Three units are provided in the front panel area, each with two light heads, to provide illumination on the main control boards. Two additional units are provided in the corridor area and two units are provided in the back panel area, each with two light heads. The Appendix R battery units are capable of providing minimum illumination for 8 hours, during which time action can be taken by maintenance to restore the normal or standby lighting system.

Based on the above discussion, sufficient lighting exists in the control room to achieve and maintain PFSSD.

References: E-15000, XX-E-013, E-093-00064, E-11NK01, E-13QB03, E-13QD01, E-1L3604, E-1L8900, E-1F9422A

5.2.36 Class 1E 125 VDC Power to Main Control Boards

Several cables that supply Class 1E 125 VDC power to the main control boards are run in area C-18. The cables run from the power supply to the control panel where the power is split to supply specific loads. The cables, power supply, control panel and affected PFSSD components are summarized in the following table.

CABLE	POWER SUPPLY	CONTROL PANEL	PFSSD EQUIPMENT	POSITION ON LOSS OF POWER	REQUIRED PFSSD POSITION
11RLK01AA	NK4119	RL001/002	BGHV8153A BGHV8154A	Closed Closed	Closed Closed
11RLK01CA	NK4112	RL017/018	EMHV8964	Closed	Closed
11RLK01DA	NK4113	RL019/020	EGTV0029 GMHZ0009	Closed Open	Closed Open
11RLK01EA	NK5109	RL021/022	BBHV8001A BBHV8002A	Closed Closed	Closed Closed

Based on the above table, the PFSSD equipment fails to the desired position upon loss of power. Therefore, damage to the cables will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13BB30, E-13BG48, E-13EG16, E-13EM12, E-13GM04, E-13RL01, E-13RL02, E-13RL03, E-13RL04, E-13RL05, E-13RL06, E-1F9301, E-1F9302, E-1F9401A, E-1F9422A, E-1F9444, M-12BB04, M-12BG01, M-12EG02, M-12EM01, M-12GM01

5.2.37 Steam Generator Blowdown to Blowdown Flash Tank Isolation Valves

Blowdown valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 are required to be closed for PFSSD. The valves are air operated and each valve is controlled by three solenoid valves. All three solenoid valves are required to be energized to open the valve. If any one solenoid is de-energized, the associated valve will close or remain closed. Only two of the three solenoids for each valve are considered in the PFSSD analysis, so the third solenoid is assumed energized throughout the event.

Cable 11RPK09CA supplies 125 VDC to relay panel RP209 from NK5113 and energizes Train A control circuit relays 3XBM13, 3XMB14, 3XBM15 and 3XBM16 associated with all four blowdown isolation valves. Damage to this cable could prevent closing the blowdown valves from BM157 in the Radwaste control room but will not affect the ability to close the valves from the main control room. Therefore, the blowdown valves can be closed using BMHIS0001A, BMHIS0002A, BMHIS003A and BMHIS0004A on main control board RL024.

Cable 15BMK16AA is the 125 VDC power feed to BM157. Cables 15BMK06AB, 15BMK06BB, 15BMK06CB and 15BMK06DB are associated with the BM157 panel mounted handswitches for each of the BMHV valves. Damage to these cables could impact the ability to close the valves from BM157 in the Radwaste Control Room. However, as stated in the previous paragraph, the normal means of closing these valves using the RL024 mounted handswitches

in the main control room remains available. Therefore, a fire in area C-18 will not prevent the closure of valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004.

Cable 15RPK09EA supplies non-class 1E 125 VDC power to panel RP211 from PK5129. Loss of power to the relay panel will result in loss of power to relay 3XBM46. The function of this relay is to close valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004 if a blowdown and sample process isolation signal is received. Under normal conditions the relay is de-energized, the auxiliary contacts are closed, and valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004 are open. Damage to cable 15RPK09EA could result in the relay remaining de-energized which would prevent a blowdown and sample process isolation signal from closing the valves. The capability to close the blowdown valves using BMHIS0001A, BMHIS0002A, BMHIS003A and BMHIS0004A in the main control room is unaffected.

Based on the above discussion, isolation of the Steam Generator Blowdown valves is achievable if a fire occurs in area C-18.

References: E-15000, XX-E-013, E-093-00048, E-13BM04, E-13BM06A, E-13BM06B, E-13BM06C, E-13BM06D, E-13BM16, E-13RP09, E-1F9101, E-1F9422A, E-1F9422C, M-12BM01

5.2.38 BOP Instrument Racks

BOP instrument racks RP053A, RP053B, RP053D and RP147 are credited in the PFSSD analysis. The following table identifies the PFSSD components served by each instrument rack.

Instrument Rack	PFSSD Components
RP053A (RP053AA, RP053AB, RP053AC)	ALHV0009 ALHV0011 ALPY037A EGFT0128 EGPSL0077 GDTSL0001 JELSL0001C
RP053B (RP053BA, RP053BB, RP053BC)	ALHV0007 ALPY0039A EGFT0129 EGPSL0078 GDTSL0011 JELSL0021C
RP053D (RP053DA, RP053DB)	ALPY0038A
RP147 (RP147A, RP147B)	ALHV0005

Cables 11RPY09CA and 11RPY09DA supply 120 VAC power to Train A BOP instrument rack RP053A. Damage to these cables could cause a loss of function of panel RP053A and associated PFSSD components.

Instrument racks RP053B, RP053D and RP147B are unaffected by the fire. Therefore, loss of PFSSD components associated with RP053A will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13AL08, E-13AL09, E-13EG13, E-13EG19, E-13JE01, E-13NN01, E-13RP09, E-1F9101, E-1F9202, E-1F9204, E-1F9401B, E-1F9411A, E-1F9411B, E-1F9424D, E-1F9443, E-K3GD04, M-12AL01, M-12EG01, M-12JE01, M-K2GD01, E-K3GD01A

5.2.39 Reactor Protection System

The Reactor Protection System (RPS) monitors specified input parameters and initiates reactor protection features whenever those parameters are outside specified limits. Field installed transmitters continuously monitor various parameters and report the results to one of four process cabinets, one per channel. Signals are then sent from the process cabinets to both solid state protection cabinets, one on each train. The cabinets and associated channel are listed in the following table.

Process Cabinets	Solid State Protection Cabinets
Cabinet SB038 - Channel 1 Cabinet SB042 - Channel 2 Cabinet SB037 - Channel 3 Cabinet SB041 - Channel 4	Cabinet SB029A - Train A Input Cabinet Cabinet SB029B - Train A Logic Cabinet Cabinet SB029C - Train A Output Cabinet 1 Cabinet SB029D - Train A Output Cabinet 2 Cabinet SB032A - Train B Input Cabinet Cabinet SB032B - Train B Logic Cabinet Cabinet SB032C - Train B Output Cabinet 1 Cabinet SB032D - Train B Output Cabinet 2

The RPS is actuated upon 2/3 or 2/4 coincident logic, depending on the input parameter. This ensures that a loss of a single channel will not prevent the system from performing its function. Loss of power to a single cabinet will render the channel or Train inoperative.

Cables associated with RPS channel 1 run through this area. These cables supply power from separation group 1 power supplies to panels SB029A, SB029D, SB032A and SB038. Power cables associated with RPS channels 2, 3 and 4 are run in a separate fire area.

Cable 11SBS12AC is a control cable associated with reactor trip switchgear cabinet SB102A. Damage to this cable could cause a reactor trip or could prevent a trip on Train A. Cables associated with Train B reactor trip switchgear cabinet SB102B are unaffected by a fire in this area.

References: XX-E-013, E-15000, E-11NK01, E-11NK02, E-13NN01, E-13SB01, E-13SB02, E-13SB05, E-13SB09, E-13SB10, E-13SB12A, E-1F9101, E-1F9102, E-1F9431, E-1F9432, E-1F9433

5.2.40 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B.

Cable 11SES01AA is a power cable associated with panel SE054A, which is associated with SR monitor SENE0031. Cable 11SES07BA is a power cable associated with SR monitor SENY0060B. Cable 11SES07BB is an instrument cable associated with SENY0060B. Cable 11SES07CA is a power cable associated with SR monitor amplifier SENY0060A. Damage to these cables could prevent operation of the associated source range monitor. Source Range monitoring remains available for a fire in area C-18 using SENE0032 and SENY0061A/B.

For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013.

References: E-15000, XX-E-013, E-13NN01, E-13SE01, E-13SE05, E-13SE07, E-1F9101, E-1F9421

5.2.41 Letdown Isolation Valves

Valves BGLCV0459 and BGLCV0460 are isolation valves installed in series on the inlet side of the regenerative heat exchanger. PFSSD requires that either of these valves be closed.

Cables 15BGK10AA and 15BGK10AD are power/control cables for the BGLCV0459 solenoid valve (BGHY0459). Air supplied by an open (energized) solenoid valve will open valve BGLCV0459. A closed (de-energized) solenoid valve will cause loss of air pressure and closure of valve BGLCV0459.

Cables 15BGK10BA and 15BGK10BD are power/control cables for the BGLCV0460 solenoid valve (BGHY0460). Air supplied by an open (energized) solenoid valve will open valve BGLCV0460. A closed (de-energized) solenoid valve will cause loss of air pressure and closure of valve BGLCV0460.

Either BGLCV0459 or BGLCV0460 must be closed or letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C must be closed. The cables for BGLCV0459 or BGLCV0460 are run in a common enclosure in cable trays. A hot short on the cables could cause the valves to open. A hot short on cables 15BGK10AA and 15BGK10BA prevents closing BGLCV0459 and BGLCV0460 from the control room. Other cables run in the cable trays have the proper voltage for hot shorts which can bypass MCB handswitches for BGLCV0459 and BGLCV0460. BGLCV0459 and BGLCV0460 constitute a high/low pressure interface. Therefore, multiple simultaneous hot shorts must be considered.

Letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C are listed as PFSSD components because of the interlock between these valves and BGLCV0459 and BGLCV0460. The interlock prevents closure of the letdown valves when any one or more orifice isolation valves are open. Cables associated with all three letdown orifice isolation valves are located in this fire area. Damage to these cables could prevent closure of the valves from the control room. Therefore, a fire in area C-18 could prevent closure of all three letdown orifice isolation valves (BGHV8149A, BGHV8149B, and BGHV8149C) as well as the two letdown isolation valves (BGLCV0459 and BGLCV0460) using their respective hand switches in the control room.

Valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B, and BGHV8149C are air operated and fail in the closed position. The valves are located in containment. Instrument air to containment is controlled by valve KAFV0029, which is unaffected by a fire in area C-18. Hand switch KAHIS0029 can be used to close the valve from the control room and isolate instrument air to containment. Pressurizer level indication is available using BBLI0459A and BBLI0460A.

Based on the above discussion, letdown valves BGLCV0459 and BGLCV0460 and letdown orifice valves BGHV8149A, BGHV8149B, and BGHV8149C can be closed from the control room if a fire occurs in area C-18.

References: E-15000, XX-E-013, E-13BG10, E-13BG35, E-13KA02, E-1F9301, M-12BG01, M-12KA01

5.2.42 Standby Diesel Generation

Cable 11KJK01AA is associated with the Train A Diesel Engine start/stop circuit. Cables 11NEB10AA and 11NEB10AD are associated with Train A diesel generator to NB01 feeder breaker NB0111. Cable 11NEK12AA is associated with Train A Diesel Generator Exciter Control. Cable 11JEG01AD is associated with the Train A fuel oil transfer pump. Damage to these cables could prevent operation and line up of the Train A diesel generator to the NB01 bus.

Calculation XX-E-013 documents a loss of off-site power evaluation that identifies the fire areas in and around the plant in which a fire could cause a loss of off-site and on-site power. Per XX-E-013 and Section 5.2.31 of this evaluation, a fire in area C-18 could cause a loss of off-site power on Train A. Train B off-site power and Train B diesel generator are unaffected by a fire in this area. Therefore, loss of the Train A diesel generator and off-site power to Train A will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-13JE01, E-13KJ01, E-13KJ01A, E-13NE10, E-13NE12, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B

5.2.43 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs.

One control cable associated with reactor coolant pumps A and B is run in fire area C-18. Damage to these cables in the event of a fire could prevent operators from stopping the A and B RCPs from the control room. However, a fire in C-18 will not cause a loss of all seal cooling since RCP seal injection remains available.

Based on the above discussion, the inability to trip the A and B RCPs from the control room will have no adverse impact on PFSSD. The pumps can continue to operate, providing forced flow circulation. If the pumps spuriously stop, natural circulation cooldown can be used.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1

5.2.44 Normal Pressurizer Spray

The normal pressurizer spray valves are included in the PFSSD design because spurious operation of pressurizer sprays can cause a decrease in pressure which can lead to boiling in the core. The pressurizer spray valves are part of the pressurizer pressure control system.

The pressurizer normal spray valves (BBPCV0455B and BBPCV0455C) operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

Cable 11BBI16KB associated with BBPT0455 is run in this area. Damage to this cable could cause a spurious high-pressure signal. As discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure input channel will not cause the spurious operation of the pressurizer spray valves due to the Ovation 4-channel validation logic, which uses the 2nd highest signal as the validated signal and has built-in logic to detect and ignore a failed input.

Cable 15BBI19AA associated with pressurizer spray valve BBPCV0455B, and cable 15BBI19BA associated with pressurizer spray valve BBPCV0455C are run in this area. Damage to these cables could cause the spurious opening of the spray valves.

The pressurizer spray valves are electro/pneumatic operated and loss of air pressure will close the valves. The air supply comes from the compressed air system. Closing valve KAFV0029 using KAHIS0029 on RL024 will isolate compressed air to containment which will cause the pressurizer spray valves to close or prevent them from opening. Based on WCNOC-CP-002, spray flow needs to be stopped within 50 minutes. Since this is a control room action, this can be completed well within 50 minutes.

Based on the above discussion, the pressurizer spray valves could spuriously open if a fire occurs in this area. Pressurizer spray can be stopped by closing valve KAFV0029 from the main control room. Pressurizer pressure indication is available using BBPI0456, BBPI0457 and BBPI0458.

References: E-15000, XX-E-013, E-13BB19, E-13KA02, M-744-00028, DCP 13324

5.2.45 Steam Generator Feedwater Pumps

Main feedwater pump steam supply valves FCFV0005 and FCFV0105 are credited in the PFSSD analysis to trip the main feedwater pumps if the main steam isolation valves (MSIVs) are affected by a fire. Closing the MSIVs stops steam flow to the feedwater pumps' turbines and stops the feedwater pumps. The steam generator feedwater pumps are tripped in the event of a fire to prevent overfilling the steam generators.

Non-Class 1E 120 VAC Inverter PN09 and distribution panel PN09A provide power to FCFV0005 trip relays in panel FC169C. Cable 15FCY35AA provides the primary source of 120 VAC power from distribution panel PN09A to panel FC169A, which distributes power to the trip relays in panel FC169C. The alternate source of power to panel FC169A is not credited for PFSSD and is assumed lost.

A fire in area C-18 could damage cable 15FCY35AA. If this occurs, operators in the control room would not be able to close valve FCFV0005 to stop steam flow to steam generator feedwater pump PAE01A.

A fire in area C-18 will not affect the ability to close the MSIVs from the control room. All-close hand switch ABHS0079 is unaffected and can be used to close the MSIVs from the control room.

Based on the above discussion, valve FCFV0005 may not close if a fire occurs in this area. However, the MSIVs can be closed using hand switch ABHS0079 in the main control room. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-13FC35, E-1F9103, E-1F9421

5.2.46 Load Center Feeder Breakers PA0105 and PA0106 and Load Center PG19 Incoming Feeder Breaker PG1901

Load center feeder breakers PA0105 and PA0106 are credited for PFSSD because they supply power to credited non-safety related loads. Cables 15PGA10AA, associated with PA0105, and 15PGA10BA and 15PGA10BB associated with PA0106, run in this area. Cables 15PGG13DA and 15PGG13DC associated with PG1901 are also run in this area. A fire induced short circuit in these cables will trip the associated breaker.

Load center feeder breaker PA0105 is credited for PFSSD because it supplies power to credited non-safety related loads. Cable 15PGA10AA is a control cable associated with breaker PA0105. An intra-cable hot short in this cable will trip the breaker. Breaker PA0105 supplies power to the following PFSSD components:

- PG11JFR2 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0031
- PG11KBR3 – Auxiliary Steam System Control Valve FBHV0081

PG11JFR2 and PG11KBR3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using hand switch ABHS0079. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Based on the above discussion, loss of breaker PA0105 will not adversely affect PFSSD if a fire occurs in this area.

Breakers PA0106 and PG1901 supply power to the following PFSSD components:

- PG19GCR217 – MCB Misc. Power Circuits RL023
- PG19GFR3 – Instr. Bus Transformer Alt. Feed XPN07D

PFSSD components supplied power from PG19GCR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG19GFR3 is credited as the backup source of power to PN07. The primary source of power to PN07 is from NG01BEF4. As discussed in Section 5.2.32 the primary source of power to PN07 could also be affected. However, as discussed in Section 5.2.34, switchboard PN08 is available to supply power to redundant PFSSD loads.

Based on the above discussion, loss of breakers PA0105, PA0106 or PG1901 will not adversely affect PFSSD if a fire occurs in this area.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-13PG10, E-1F9424E, KD-7496, DCP 13324

FIRE AREA C-19

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-19 is located on the 2016 elevation of the Control Building and includes the room listed in Table C-19-1.

Table C-19-1
Rooms Located in Fire Area C-19

ROOM #	DESCRIPTION
C19	North Small Elec Chase 2016 Elevation

Fire area C-19 is protected with an automatic fire suppression and detection system. The area is bounded on all sides by minimum 3-hour fire resistance rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-19-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-19-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-19

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Power to steam generator ARV ABPV0003 controller could be lost. This will fail the valve in the closed position and prevent opening from the control room. The remaining steam generator ARVs are unaffected.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.

Table C-19-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-19

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.

Table C-19-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-19

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
NF	Load Shed and Emergency Load Sequencing	S	All PFSSD functions associated with load shed/emergency load sequencing system are satisfied. Separation group 3 power supply cables for load shedder/sequencer logic and input cabinets NF039A and NF039B could be affected. Redundant AC power is available from separation groups 1, 2 and 4 power supplies.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
NN	120VAC	S	One of two sources of 125 VDC power to swing inverter NN15 could be affected. The remaining source is unaffected. Swing inverter NN15 may not be able to supply power to bus NN03. Inverter NN13 is unaffected and can supply 120 VAC power to NN03.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.

Table C-19-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-19

System	System Name	PFSSD Function*	Comments
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
RP	Miscellaneous Control Panels	R, M, H, P, S	Power to panel RP053DB could be affected, which will prevent opening steam generator ARV ABPV0003. The remaining RP panels are unaffected.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
SB	Reactor Protection System	R, S	RPS Channel 3 could be affected. RPS Channels 1, 2 and 4 are unaffected.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-19.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-19. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Redundant post-fire safe shutdown capability is unaffected by a fire in area C-19.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-19.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-19

There are no PFSSD components located in fire area C-19. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-19-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-19. The applicable evaluation section is also listed in Table C-19-3.

Table C-19-3
PFSSD Cables Located in Fire Area C-19

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
13NFK01CA	C19	127-3/DG	C	5.2.1	NB01 Undervoltage Relay
13NFK01DA	C19	127-3/DG	C	5.2.1	NB02 Undervoltage Relay
13NFY01EA	C19	127-3/DG PTNB117/B	P	5.2.1	NB01 UV Relay and Degraded Voltage Potential Transformer
13NFY01FA	C19	127-3/DG PTNB217/B	P	5.2.1	NB02 UV Relay and Degraded Voltage Potential Transformer
13NFY01GA	C19	PTNB117/B	C	5.2.1	NB01 Degraded Voltage Potential Transformer
13NFY01HA	C19	PTNB217/B	C	5.2.1	NB02 Degraded Voltage Potential Transformer
13NNK01KA	C19	NN15	P	5.2.4	125 VDC Power to Swing Inverter NN15
13NNK01KB	C19	NN15	P	5.2.4	125 VDC Power to Swing Inverter NN15
13NNY01FA	C19	NN13	P	5.2.4	120 VAC Power from NN15 to NN13
13NNY01FB	C19	NN13	P	5.2.4	120 VAC Power from NN15 to NN13
13RPY09AA	C19	RP053DB	P	5.2.2	120 VAC to BOP Instrumentation Rack from NN0307
13SBS01CD	C19	SB029A	P	5.2.3	120 VAC to SSPS A Input Panel from NN0309
13SBS02CD	C19	SB032A	P	5.2.3	120 VAC to SSPS B Input Panel from NN0310
13SBY09EA	C19	SB037	P	5.2.3	120 VAC to Process Protection Set 3 Panel from NN0311

5.2.1 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

The outputs from each safeguards bus (NB01 and NB02) are divided into 4 separation groups; 1, 2, 3 and 4 and routed to two control panels, NF039A and NF039B. The input section of each control panel also receives group 1, 2, 3 and 4 instrument power (120VAC). The inputs then pass through isolation devices, at which point all inputs to NF039A become separation group 1 and all inputs to NF039B become separation group 4. Interruption of either the inputs or the instrument power from one separation group would impact the associated input channel, but would not impact the other 3 input channels.

Cables 13NFK01CA and 13NFK01DA are associated with separation group 3 UV relays on buses NB01 and NB02, respectively. Cables 13NFY01GA and 13NFY01HA are associated with separation group 3 degraded voltage PTs on buses NB01 and NB02, respectively. Cables associated with the remaining three UV relays and PTs from separation groups 1, 2 and 4 do not run in fire area C-19.

Separation group 3 120VAC instrument power supply cables 13NFY01EA and 13NFY01FA for load shedder/sequencer logic and input cabinets NF039A and NF039B, respectively, run in fire area C-19. Damage to these cables could cause a loss of separation group 3 120 VAC instrument power to the group 3 input panels, and therefore loss of input channel 3. Channels 1, 2 and 4 instrument AC power remains available from separation groups 1, 2 and 4 power supplies.

Based on the above discussion, the Train A and Train B load shed/sequencers are available if a fire occurs in this area. Off-site power to both trains is unaffected based on Calculation XX-E-013, Appendix 2.

References: XX-E-013, E-15000, E-11005, E-11NB02, E-13NF01, E-092, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, J-104-00347

5.2.2 Steam Generator Atmospheric Relief Valves

PFSSD requires at least two steam generator atmospheric relief valves (ARV) be controlled and the other two closed. The ARVs are pneumatically operated using air from the compressed air system (KA) or nitrogen from the nitrogen accumulators. The valves open by pneumatic pressure and close by spring action. A pressure transmitter installed on the outlet side of the steam generator sends a signal to a controller and automatically controls the associated ARV position. Alternatively, each ARV can be controlled manually from the control room or the auxiliary shutdown panel by placing the pressure indicating controller (PIC) in manual.

Cable 13RPY09AA supplies 120 VAC power to Train A BOP instrument rack RP053DB. The only PFSSD components controlled by RP053DB are ABPIC0003A, ABPIC0003B, ABHS0003,

ABPT0003 and ABPY0003. These components are associated with steam generator C ARV ABPV0003. Loss of power to these components due to damage to cable 13RPY09AA will cause ABPV0003 to fail closed, which is the desired PFSSD position for a fire in this area.

Calculation WCNOC-CP-002 demonstrates that sufficient heat removal capability exists using three steam generator ARVs. Therefore, failure of the fourth ARV to open will have no adverse impact on PFSSD.

Based on the above discussion, damage to the cable associated with ARV ABPV0003 in this area will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13NN01, E-13RP09, E-1F9101, M-12AB01, J-110-00588, Calculation WCNOC-CP-002

5.2.3 Reactor Protection System

The Reactor Protection System (RPS) monitors specified input parameters and initiates reactor protection features whenever those parameters are outside specified limits. Field installed transmitters continuously monitor various parameters and report the results to one of four process cabinets, one per channel. Signals are then sent from the process cabinets to both solid state protection cabinets, one on each train. The cabinets and associated channel are listed in the following table.

Process Cabinets	Solid State Protection Cabinets
Cabinet SB038 - Channel 1 Cabinet SB042 - Channel 2 Cabinet SB037 - Channel 3 Cabinet SB041 - Channel 4	Cabinet SB029A - Train A Input Cabinet Cabinet SB029B - Train A Logic Cabinet Cabinet SB029C - Train A Output Cabinet 1 Cabinet SB029D - Train A Output Cabinet 2 Cabinet SB032A - Train B Input Cabinet Cabinet SB032B - Train B Logic Cabinet Cabinet SB032C - Train B Output Cabinet 1 Cabinet SB032D - Train B Output Cabinet 2

The RPS is actuated upon 2/3 or 2/4 coincident logic, depending on the input parameter. This ensures that a loss of a single channel will not prevent the system from performing it's function.

Cables associated with reactor protection system channel 3 run through this area. These cables supply power from separation group 3 power supplies to panels SB029A, SB032A and SB037. Damage to these cables could cause a loss of RPS channel 3, but channels 1, 2 and 4 remain available. Therefore, the RPS is available if a fire occurs in this area.

References: XX-E-013, E-15000, E-13NN01, E-13SB01, E-13SB02, E-13SB03, E-13SB04, E-13SB05, E-13SB09, E-1F9431, E-1F9432, E-1F9433, J-10SA

5.2.4 Class 1E 120 VAC Electrical Distribution System

The Class 1E 120 VAC electrical distribution system provides power to vital instrumentation and control loads for shutdown and normal operation. Under normal conditions, the system is supplied by inverters connected to the 125 VDC NK battery system. Swing inverters allow the primary inverters to be taken out of service for maintainance or repair without disrupting power to the associated vital AC bus. In the event of a loss of power to the inverters, a backup source of power is automatically lined up. The backup power source originates from the 480 VAC electrical distribution system (NG).

Cables 13NNK01KA and 13NNK01KB supply 125 VDC power from NK0303 to manual transfer switch NK79. Damage to these cables will disrupt the 125 VDC power supply from NK0303 to swing inverter NN15. 125 VDC power from NK0103 to swing inverter NN15 is unaffected.

Cables 13NNY01FA and 13NNY01FB supply 120 VAC power from swing inverter NN15 to bus NN03 through a manual transfer switch in inverter NN13. Damage to these cables will disrupt the 120 VAC power supply from swing inverter NN15 to NN03.

Inverters NN11 and NN13 and 120 VAC vital distribution buses NN01 and NN03 are located in a separate fire area and are unaffected by a fire in area C-19. The 125 VDC and 480 VAC power supply to inverters NN11 and NN13 are unaffected by a fire in area C-19.

Based on the above discussion, the Train A and Train B vital 120 VAC electrical distribution system is unaffected by a fire in this area.

References: XX-E-013, E-15000, E-13NN01

FIRE AREA C-20

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-20 is located on the 2016 elevation of the Control Building and includes the room listed in Table C-20-1.

Table C-20-1
Rooms Located in Fire Area C-20

ROOM #	DESCRIPTION
C20	South Small Elec Chase 2016 Elevation

Fire area C-20 is protected with an automatic fire suppression and detection system. The area is bounded on all sides by minimum 3-hour fire rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-20-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-20-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-20

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	It may be necessary to isolate SG B ARV using local control station ABFHC0002. Steam generators A, C and D ARVs are unaffected. Valves ABHV0005 and ABHV0006 could be affected, preventing operation of the turbine driven auxiliary feedwater pump. Both motor driven auxiliary feedwater pumps are available.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
AE	Main Feedwater	H, P	Steam generator B wide range water level transmitter AELT0502 may be affected. Remaining steam generator level transmitters are unaffected.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. The turbine driven auxiliary feedwater pump (TDAFP) may not be available. The motor driven auxiliary feedwater pumps are unaffected.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
BB	Reactor Coolant System	R, M, H, P, S	Pressurizer level transmitter BBLT0460 may be affected. Redundant pressurizer level transmitter BBLT0459 is unaffected. RCS Temperature elements BBTE0423B and BBTE0443A, as well as associated temperature indicators, could be affected by a fire in this area. The remaining temperature elements/indicators are unaffected.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.

Table C-20-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-20

System	System Name	PFSSD Function*	Comments
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
FC	Auxiliary Turbines	R, H, P	The TDAFP speed control valve FCFV0313 and trip and throttle valve FCHV0312 could be affected. The motor driven auxiliary feedwater pumps are available.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.

Table C-20-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-20

System	System Name	PFSSD Function*	Comments
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
NF	Load Shed and Emergency Load Sequencing	S	All PFSSD functions associated with load shed/emergency load sequencing system are satisfied. Separation group 2 power supply cables for load shedder/sequencer logic and input cabinets NF039A and NF039B could be affected. Redundant AC power is available from separation groups 1, 3 and 4 power supplies.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
NN	120VAC	S	One of two sources of 125 VDC power to swing inverter NN16 could be affected. The remaining source is unaffected. Swing inverter NN16 may not be able to supply power to bus NN02. Inverter NN12 is unaffected and can supply 120 VAC power to NN02.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.

Table C-20-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-20			
System	**System Name**	**PFSSD Function***	**Comments**
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
RP	Miscellaneous Control Panels	R, M, H, P, S	Power to lockout relays 86XRP1, 86XRP2 and 86XRP3 could be affected. This will not impact PFSSD.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
SB	Reactor Protection System	R, S	RPS Channel 2 could be affected. RPS Channels 1, 3 and 4 are unaffected.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
SE	Ex-Core Neutron Monitoring	R, P	Source range monitor SENE0032B could be affected. Source range monitoring remains available using SENI0031B, SENI0060A/B and SENI0061A/B.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-20.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-20. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs

If damage occurs to cables associated with ABPV0002, local control station ABFHC0002, located in room 1509, can be used to close ARV ABPV0002.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Redundant post-fire safe shutdown capability is unaffected by a fire in area C-20.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-20.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-20

There are no PFSSD components located in fire area C-20. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-20-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-20. The applicable evaluation section is also listed in Table C-20-3.

Table C-20-3
PFSSD Cables Located in Fire Area C-20

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12ABI20FE	C20	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FG	C20	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FH	C20	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FJ	C20	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FK	C20	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FL	C20	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FM	C20	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FN	C20	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABK01AD	C20	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12ABK01AE	C20	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12ABK01AF	C20	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12ABK01AG	C20	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12ABK01BD	C20	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12ABK01BE	C20	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12ABK01BF	C20	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12ABK01BG	C20	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12AEI08GB	C20	AELT0502	I	5.2.3	SG B Wide Range Level Indication
12ALI07KD	C20	ALPT0026	I	5.2.1	TDAFP Suction Pressure Transmitter
12ALI07KE	C20	ALPI0026B	I	5.2.1	TDAFP Suction Pressure Indicator at RP118B
12ALI07KF	C20	ALPI0026A	I	5.2.1	TDAFP Suction Pressure Indicator at RL005
12BBI15HB	C20	BBTE0423B	I	5.2.3	RCS Cold Leg Temp Element (WR) Loop 2
12BBI15JB	C20	BBTE0443A	I	5.2.3	RCS Hot Leg Temp Element (WR) Loop 4
12BBI16QB	C20	BBLT0460	I	5.2.3	Pressurizer Level Indication

Table C-20-3
PFSSD Cables Located in Fire Area C-20

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12FCK23AA	C20	FCHV0312	C	5.2.1	TDAFP Trip and Throttle Valve
12FCK23AR	C20	FCHV0312	P	5.2.1	TDAFP Trip and Throttle Valve
12FCK23AS	C20	FCHV0312	C	5.2.1	TDAFP Trip and Throttle Valve
12FCK23AU	C20	FCHV0312	P	5.2.1	TDAFP Trip and Throttle Valve
12FCK24AK	C20	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12FCK24AL	C20	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12FCK24AM	C20	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12FCK24AN	C20	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12FCK24AP	C20	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12FCK24AQ	C20	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12NFK01CA	C20	NF039A	C	5.2.2	Load Shedder / Emergency Load Sequencer
12NFK01DA	C20	NF039B	C	5.2.2	Load Shedder / Emergency Load Sequencer
12NFY01CA	C20	NF039A	P	5.2.2	120 VAC Power to NF039A from NN0206
12NFY01DA	C20	NF039B	P	5.2.2	120 VAC Power to NF039B from NN0204
12NFY01EA	C20	NF039A	C	5.2.2	Load Shedder / Emergency Load Sequencer
12NFY01FA	C20	NF039B	C	5.2.2	Load Shedder / Emergency Load Sequencer
12NNK01LA	C20	NN16	P	5.2.7	125 VDC Power to Swing Inverter NN16
12NNK01LB	C20	NN16	P	5.2.7	125 VDC Power to Swing Inverter NN16
12NNY01GA	C20	NN12	P	5.2.7	120 VAC Pwr to NN12 from Swing Inv NN16
12NNY01GB	C20	NN12	P	5.2.7	120 VAC Pwr to NN12 from Swing Inv NN16
12RLK01AA	C20	RL005/RL006	P	5.2.1	Turbine Generator & Feedwater Control Panel
12RPK09AA	C20	FCFV0313	P	5.2.1	TDAFP Speed-Governing Valve
12RPK09BA	C20	RP334	P	5.2.4	Auxiliary Relay Rack

Table C-20-3
PFSSD Cables Located in Fire Area C-20

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12RPK15AA	C20	FCHV0312	C	5.2.1	TDAFP Trip and Throttle Valve
12RPK15BA	C20	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12RPK15CA	C20	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12RPY09AA	C20	RP053DA	P	5.2.1	120 VAC to BOP Instrumentation Rack from NN0208
12RPY09BA	C20	RP147A	P	5.2.1	120 VAC to RP147A from NN0203
12SAK21CA	C20	SA036C	P	5.2.1	125 VDC to ESFAS Channel 2 Term Cab from NK4205
12SAY21CA	C20	SA036C	P	5.2.1	120 VAC to ESFAS Channel 2 Term Cab from NN0205
12SBS01BD	C20	SB029A	P	5.2.5	120 VAC to SSPS A Input Panel from NN0210
12SBS02BD	C20	SB032A	P	5.2.5	120 VAC to SSPS B Input Panel from NN0209
12SBS16AA	C20	AELI0502A	I	5.2.3	Steam Generator B Wide Range Water Level
12SBS16BA	C20	BBTI0423X	I	5.2.3	RCS Cold Leg Loop 2 Temperature
12SBS16GA	C20	BBLI0460B	I	5.2.3	Pressurizer Level Narrow Range
12SBS16HA	C20	BBTI0443A	I	5.2.3	RCS Hot Leg Loop 4 Temperature
12SBY09DA	C20	SB042	P	5.2.5	120 VAC to Process Protection Set 2 Panel from NN0212
12SBY09GA	C20	SB148A	P	5.2.3	120 VAC to Control Room Isolation Cabinet from NN0217
12SES02AA	C20	SE054B	P	5.2.6	120 VAC to Nuclear Instrument Panel from NN0211

5.2.1 Auxiliary Feedwater and Steam Generator Atmospheric Relief Valves

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. Atmospheric relief valves on the two steam generators being fed need to be controlled and atmospheric relief valves on the remaining two steam generators need to be closed. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire auxiliary feedwater (AFW) demand to achieve cold shutdown.

Cables associated with ABHV0005, ABHV0006, FCHV0312 and FCFV0313 are run in area C-20. Damage to these cables could either cause all four valves to spuriously open at the same time, causing uncontrolled blowdown through the TDAFP, or prevent operation of one or more valve, preventing operation of the TDAFP. Uncontrolled cooldown is mitigated by FCFV0313 tripping on high speed. The Train A and Train B MDAFPs are available to supply feedwater to all four steam generators.

A number of cables associated with steam generator B ARV ABPV0002 are run in this area. Damage to these cables could cause the ARV to spuriously open and could prevent control from the control room. If this occurs, operators may need to control or close ABPV0002 using local controller ABFHC0002 in room 1509.

Cable 12RLK01AA supplies power to RL005/RL006 from switch NK4206. The PFSSD components on RL005/RL006 supplied by NK4206 are ABHV0005 and ABHV0006. Loss of power will fail the valves open, which is desired for operation of the turbine driven auxiliary feedwater pump (TDAFP).

Cable 12RPY09AA supplies 120 VAC power from NN0208 to BOP instrument rack RP053DA. Damage to this cable will affect the following PFSSD components:

- ALPY0038A - ESFAS LOW SUCTION PRESSURE SIGNAL CONVERTER
- ALPT0038 - ESFAS LOW SUCTION PRESSURE TRANSMITTER
- ABPIC0002A - STM GEN B ATM STEAM DUMP PRESSURE CONTROLLER
- ABHS0002 - ABPV0002 HANDSWITCH
- ALPI0026A - TDAFW PUMP PAL02 SUCTION PRESSURE

Low suction pressure (LSP) on 2 out of 3 AFW pressure transmitters (ALPT0037, ALPT0038 and ALPT0039) coincident with an auxiliary feedwater actuation signal (AFAS) will swap the AFW supply to ESW. Loss of power to ALPT0038 and ALPY0038A will satisfy 1/3 LSP logic, placing the LSP signal logic in a 1 out of 2 configuration. Therefore, low suction pressure or loss of power on another pressure transmitter will provide the permissive to swap if an AFAS is present.

Loss of power to ABPIC0002A and ABHS0002 could prevent operation of steam generator B ARV ABPV0002 from the control room. If this occurs, operators may need to control or close ABPV0002 using local controller ABFHC0002 in room 1509.

Loss of power to ALPI0026A will provide false indication of TDAFP suction pressure. In addition, other cables (12ALI07KD, 12ALI07KE and 12ALI07KF) associated with pressure transmitter ALPT0026 are located in this area. Damage to these cables will prevent indication of TDAFP suction pressure. The transmitter does not initiate any automatic functions and the TDAFP is not credited for a fire in this area. Train A and Train B MDAFP suction pressure indicators are unaffected.

Cable 12RPY09BA supplies 120 VAC power to RP147A. The only PFSSD component controlled by RP147A is ABPV0002. Therefore, loss of power to RP147A could prevent operation of ABPV0002.

Panel SA036C monitors pressure transmitter signals on ALPT0038 and provides AFAS outputs. Power cables 12SAK21CA and 12SAY21CA associated with SA036C are run in this area. Damage to these cables could result in a loss of power to the panel but will not prevent automatic operation of low suction pressure (LSP) swapover since the remaining 2 channels are available. AFAS is not credited for PFSSD but is analyzed for potential adverse impacts.

Based on the above discussion, the TDAFP may be affected but both MDAFPs are available to provide feedwater to the steam generators. Steam generator B ARV ABPV0002 may need to be controlled or closed using local controller ABFHC0002. Uncontrolled blowdown through the TDAFP is mitigated by FCFV0312 automatically tripping on high speed.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: XX-E-013, E-15000, E-13AB01, E-13AB01A, E-13AB20B, E-13FC23, E-13FC24, E-13RL01, E-13RP09, E-13RP15, E-1F9101, J-02AB01, J-02AB03, J-110-00348, J-110-00590, J-110-00642, J-110-00647, J-110-00938, J-110-00942, M-12AB01, M-12AB02, M-12FC02

5.2.2 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

The outputs from each safeguards bus (NB01 and NB02) are divided into 4 separation groups; 1, 2, 3 and 4 and routed to two control panels, NF039A and NF039B. The input section of each control panel also receives group 1, 2, 3 and 4 instrument power (120VAC). The inputs then pass through isolation devices, at which point all inputs to NF039A become separation group 1 and all inputs to NF039B become separation group 4. Interruption of either the inputs or the instrument power from one separation group would impact the associated input channel, but would not impact the other 3 input channels.

Cable 12NFY01CA supplies 120 VAC power to LSELS panel NF039A. Cable 12NFY01DA supplies 120 VAC power to LSELS panel NF039B. Panels NF039A and NF039B have four sources of Class 1E 120 VAC power, each from separate 120 VAC distribution switchboards, two on Train A and two on Train B. The LSELS system operates when a degraded voltage condition exists on 2 out of 4 sensors on a single 4,160 volt Class 1E bus. Loss of one source of AC power to each panel will have no adverse impact on PFSSD since 120 VAC power remains available from the remaining three sources.

Cables 12NFK01CA and 12NFK01DA are associated with separation group 2 UV relays on buses NB01 and NB02, respectively. Cables 12NFY01EA and 12NFY01FA are associated with separation group 2 degraded voltage PTs on buses NB01 and NB02, respectively. Cables associated with the remaining three UV relays and PTs from separation groups 1, 3 and 4 do not run in fire area C-20.

Automatic functioning of the bus NB01 and NB02 emergency load shedder / sequencer is unaffected by a fire in area C-20 because of the presence of circuits for only one of the four load shed/sequencer initiators. Therefore, a spurious start of the Train A and Train B diesel generators due to a false undervoltage condition on two of the four circuits is not credible.

Based on the above discussion, the Train A and Train B load shed/sequencers are available if a fire occurs in this area. Off-site power to both trains is unaffected based on Calculation XX-E-013, Appendix 2.

References: XX-E-013, E-15000, E-11005, E-13NF01, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, J-104-00347

5.2.3 Process Monitoring

Process monitoring is required to achieve and maintain safe shutdown. Some of the process instruments credited for safe shutdown could be affected by a fire in area C-20. These instruments, as well as the available redundant capability, are described in the following paragraphs.

Steam generator level indication is required to support the decay heat removal function. At least one level transmitter is required on each steam generator being used for heat removal. Cable 12AEI08GB, associated with steam generator B wide range level transmitter AELT0502, and 12SBS16AA, associated with steam generator B wide range level indicator AELI0502A, are run in fire area C-20. Narrow range level indication on steam generator B remains available. Cables for the remaining level transmitters are not run in fire area C-20. Therefore, level indication on all four steam generators is available.

RCS hot and cold leg temperature indication is required on at least one loop to verify sufficient flow through the steam generators to ensure RCS decay heat removal. The following table lists the RCS temperature elements credited for PFSSD.

RCS Hot and Cold Leg Temperature Elements Used for PFSSD	
COMPONENT	**FUNCTION**
BBTE0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	RCS Cold Leg Temperature Element (WR) Loop 4

Temperature elements BBTE0423B and BBTE0443A, as well as associated temperature indicators, could be affected by a fire in this area due to damage to cables 12BBI15HB, 12BBI15JB, 12SBS16BA and 12SBS16HA. The remaining temperature elements/indicators

are unaffected. Therefore, RCS hot and cold leg temperature indication remains available on loops 1 and 3.

Pressurizer level indication is required to be available to ensure sufficient make-up inventory is provided to compensate for RCS fluid shrinkage during cooldown and losses from the system. Pressurizer level indication is provided by level transmitters BBLT0459 and BBLT0460. Cables 12BBI16QB and 12SBS16GA for BBLT0460 are run in area C-20, so BBLI0460 may not be available. Circuits for BBLT0459/BBLI0459A do not run through fire area C-20 and are unaffected by a fire. Therefore, pressurizer level indication is available for a fire in area C-20 using BBLT0459/BBLI0459A.

Cable 12SBY09GA supplies 120 VAC power from NN0217 to RP148A. Panel SB148A receives signals from certain field transmitters (BBLT0460, BBTE0423, AELT0502 and BBTE0443) and sends the signals to the control room and the auxiliary shutdown panel (ASP). This ensures reliable diagnostic instrumentation is available at the ASP if a fire occurs in the control room. Loss of 120 VAC power to SB148A will prevent signals from these transmitters from reaching the control room and the ASP. However, redundant diagnostic instrumentation remains available in the control room. Therefore, loss of AC power will not impact PFSSD.

Based on the above discussion, process monitoring is available if a fire occurs in fire area C-20.

References: E-15000, XX-E-013, E-13AE08, E-13BB15, E-13BB16, E-13NN01, E-13SB09, E-13SB16, E-1F9201, E-1F9203, E-1F9301, M-12AE02, M-12BB01, M-12BB02

5.2.4 Relay Rack RP334

Cable 12RPK09BA supplies 125 VDC power from NK4201 to auxiliary relay rack RP334. The only relays in RP334 that are required for PFSSD are 86XRP1, 86XRP2 and 86XRP3. These are lockout relays used to isolate the control room if a fire occurs in the control room. Loss of DC power to the relays will prevent isolating the control room but will not cause a spurious control room isolation signal. Control room isolation is not required if a fire occurs in area C-20. Therefore, loss of DC power will not impact PFSSD.

References: XX-E-013, E-15000, E-13RP09, E-13RP15, E-093-00093

5.2.5 Reactor Protection System

The Reactor Protection System (RPS) monitors specified input parameters and initiates reactor protection features whenever those parameters are outside specified limits. Field installed transmitters continuously monitor various parameters and report the results to one of four process cabinets, one per channel. Signals are then sent from the process cabinets to both solid state protection cabinets, one on each train. The cabinets and associated channel are listed in the following table.

Process Cabinets	Solid State Protection Cabinets
Cabinet SB038 - Channel 1 Cabinet SB042 - Channel 2 Cabinet SB037 - Channel 3 Cabinet SB041 - Channel 4	Cabinet SB029A - Train A Input Cabinet Cabinet SB029B - Train A Logic Cabinet Cabinet SB029C - Train A Output Cabinet 1 Cabinet SB029D - Train A Output Cabinet 2 Cabinet SB032A - Train B Input Cabinet Cabinet SB032B - Train B Logic Cabinet Cabinet SB032C - Train B Output Cabinet 1 Cabinet SB032D - Train B Output Cabinet 2

The RPS is actuated upon 2/3 or 2/4 coincident logic, depending on the input parameter. This ensures that a loss of a single channel will not prevent the system from performing it's function.

Cables 12SBS01BD, 12SBS02BD and 12SBY09DA associated with reactor protection system channel 2 run through this area. These cables supply power from separation group 2 power supplies to panels SB029A, SB032A and SB042. Damage to these cables could cause a loss of RPS channel 2, but channels 1, 3 and 4 remain available. Therefore, the RPS is available if a fire occurs in this area.

References: XX-E-013, E-15000, E-13NN01, E-13SB01, E-13SB02, E-13SB03, E-13SB04, E-13SB05, E-13SB09, E-1F9431, E-1F9432, E-1F9433, J-10SA

5.2.6 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available to provide indication of cold shutdown reactivity conditions. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B.

Cable 12SES02AA supplies power to SE054B from NN0211. Panel SE054B is associated with source range neutron indicator SENI0032B. Loss of power to the panel will prevent SENI0032B from operating. Source range monitoring remains available using SENI0031B, SENI0060A/B and SENI0061A/B.

References: XX-E-013, E-15000, E-13SE02, E-1F9101

5.2.7 Class 1E 120 VAC Electrical Distribution System

The Class 1E 120 VAC electrical distribution system provides power to vital instrumentation and control loads for shutdown and normal operation. Under normal conditions, the system is supplied by inverters connected to the 125 VDC NK battery system. Swing inverters allow the primary inverters to be taken out of service for maintainance or repair without disrupting power to the associated vital AC bus. In the event of a loss of power to the inverters, a backup source of power is automatically lined up. The backup power source originates from the 480 VAC electrical distribution system (NG).

Cables 12NNK01LA and 12NNK01LB supply 125 VDC power from NK0203 to manual transfer switch NK80. Damage to these cables will disrupt the 125 VDC power supply from NK0203 to swing inverter NN16. 125 VDC power from NK0403 to swing inverter NN16 is unaffected.

Cables 12NNY01GA and 12NNY01GB supply 120 VAC power from swing inverter NN16 to bus NN02 through a manual transfer switch in inverter NN12. Damage to these cables will disrupt the 120 VAC power supply from swing inverter NN16 to NN02.

Inverters NN12 and NN14 and 120 VAC vital distribution buses NN02 and NN04 are located in a separate fire area and are unaffected by a fire in area C-20. The 125 VDC and 480 VAC power supply to inverters NN12 and NN14 are unaffected by a fire in area C-20.

Based on the above discussion, the Train A and Train B vital 120 VAC electrical distribution system is unaffected by a fire in this area.

References: XX-E-013, E-15000, E-13NN01

FIRE AREA C-21

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-21 is located on the 2032 elevation of the Control Building and includes the room listed in Table C-21-1.

Table C-21-1
Rooms Located in Fire Area C-21

ROOM #	DESCRIPTION
3501	Lower Cable Spreading Room

Fire area C-21 is protected with an automatic wet-pipe sprinkler system. In addition, automatic fire detection is installed throughout. The automatic suppression and detection system meets the requirements of 10CFR50, Appendix R, Section III.G.2. The area is separated from adjacent areas by minimum 3-hour fire resistant construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-21-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-21-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-21

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Steam generators A and C ARV control may be lost. Steam generator ARVs B and D are unaffected. Cooldown is assured using Aux Feedwater Pump B supplying steam generator D and the Turbine Driven Auxiliary Feedwater Pump supplying steam generator B. ABHS0080 may not be available to close the MSIVs and MSIV bypass valves. ABHS0079 is available to close the MSIVs and MSIV bypass valves. Steam line pressure transmitters ABPT0514, ABPT0524, ABPT0526, ABPT0534, ABPT0536 and ABPT0544 could be affected. In addition, steam line pressure instruments ABPI0514A, ABPI0524A, ABPI0526A, ABPI0534A, ABPI0536A and ABPI0544A in the main control room could be affected. Remaining steam line pressure transmitters and indicators are available.
AC	Main Turbine	R, H	A cable associated with turbine manual trip pushbuttons ACHS0002A and ACHS0002B could be damaged, which could prevent tripping the turbine from the control room. PFSSD is assured by isolating the MSIVs and MSIV bypass valves using ABHS0079.
AE	Main Feedwater	H, P	All PFSSD functions associated with the main feedwater system are satisfied. Steam generator A level indication is available using AELI0517 and AELI0519. Steam generator B level indication is available using AELI0502, AELI0527 and AELI0552. Steam generator C level indication is available using AELI0537 and AELI0553. Steam generator D level indication is available using AELI0504, AELI0547 and AELI0549. Isolate all four main feedwater isolation valves using hand switch AEHS0081.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. Train B MDAFP is available to supply SGs A and D, however SG A ARV ABPV0001 could spuriously open and may need to be failed closed. The TDAFP is available to supply SGs B and C, however SG C ARV ABPV0003 could spuriously open and may need to be locally controlled or closed. Pressure transmitters/indicators ALPT0037/ALPI0037 and ALPT0038/ALPI0038A may be affected. Auxiliary feedwater suction pressure indication is available using pressure transmitter/indicator ALPT0039/ALPI0039A.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-21.

Table C-21-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-21

System	System Name	PFSSD Function*	Comments
BB	Reactor Coolant System	R, M, H, P, S	Pressurizer PORV BBPCV0455A may open and block valve BBHV8000A may not close. If this occurs, Operators can close the PORV by placing BBHIS0455A in the CLOSE position. RCS pressure transmitter BBPT0405 could be affected. RCS pressure indication is available using BBPI0406. Pressurizer level transmitter BBLT0459 could be affected. Pressurizer level indication is available using BBLI0460A. Pressurizer pressure transmitters BBPT0455 and BBPT0457 could be affected. Pressurizer pressure transmitters BBPT0456 and BBPT0458 are unaffected. Pressurizer pressure indication is available using BBPI0456 and BBPI0458. Loss of inventory through the head vent valves is prevented by maintaining valve BBHV8002A closed and either BBHV8001B or BBHV8002B closed. Hand switch BGHIS8153A needs to be maintained in the close position to prevent an external hot short from opening valve BBHV8002A. RCS Loop 1 Wide Range Cold Leg Temperature Element BBTE413B and RCS Loop 4 Wide Range Hot Leg Temperature Element BBTE443A are available. RCP thermal barrier cooling could be affected due to spurious closure of BBHV0013, BBHV0014, BBHV0015 and BBHV0016. Reactor coolant pumps A and B may not stop using the control room hand switch. RCP seal injection remains available. Therefore, the inability to stop the RCPs will have no adverse impact on PFSSD. Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, the valves can be closed by closing valve KAV0201 in fire area A-25.
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. Train B Centrifugal Charging Pump (CCP) is available to provide charging flow from the RWST to the RCP seals through valve BGHV8357B. VCT level indicator BGLI0112 could be affected. Level indicator BGLI0185 is available to determine VCT level. Normal charging is isolated using BGHIS8105 to close valve BGHV8105. Cables for valve BGHV8106 could be damaged. Valves BGHV8153A and either BGHV8153B or BGHV8154B are maintained closed to isolate excess letdown. Letdown isolation valves BGLCV0459 and BGLCV0460 and letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C may need to be failed closed by closing valve KAV0201 in fire area A-25. RCP seal flow indication is available using BGFI0215B. RCP seal flow indicator BGFI0215A may be affected.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-21.

Table C-21-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-21

System	System Name	PFSSD Function*	Comments
BN	Borated Refueling Water Storage System	R, M, H	The RWST is available to provide a suction source to Centrifugal Charging Pump B via valve BNLCV0112E.
EF	Essential Service Water System	H, S	All PFSSD functions associated with the essential service water system are satisfied. Train A ESW is unavailable due to damage to a number of associated components. Train B ESW is unaffected.
EG	Component Cooling Water System	S	All PFSSD functions associated with the component cooling water system are satisfied. A number of Train A CCW system components could be affected. The Train B CCW system is unaffected. CCW flow to the RCP thermal barriers could be affected as discussed in BB System comments above. CCW to RCP flow indicator EGFI0128 could be affected. CCW to RCP flow indicator EGFI0129 is unaffected. Valve EGHV0101 could be affected, preventing operation of Train A RHR. Valve EGHV0102 is unaffected.
EJ	Residual Heat Removal System	M, H, P	A number of Train A RHR system cables may be affected by a fire in this area. The Train B RHR system is available but a cold shutdown repair or containment entry may be required to open EJHV8701B.
EM	High Pressure Coolant Injection	R, M	All PFSSD functions associated with the high pressure coolant injection system are satisfied. BIT inlet valve EMHV8803A may be affected but valves EMHV8801B and EMHV8803B are available to ensure an available BIT flowpath using Train B CCP. The Train A SI Pump may spuriously start but the spurious actuation will not adversely impact PFSSD since the pump will be dead headed against RCS pressure. Therefore, no inventory will be lost from the RWST. In this condition, the pump could experience cavitation damage but this is a commercial concern, not a PFSSD concern. Operators can disconnect power to the pump by opening breaker NB0103, but this action is not required for PFSSD. SI test line valves EMHV8882 and EMHV8964 could be affected. The SI test line can be isolated by closing valve EMHV8871. A spurious SIS due to low pressurizer pressure or low steam line pressure can be terminated by entering EMG E-0 and taking the necessary actions.
EN	Containment Spray	R, M	Both containment spray pumps PEN01A and PEN01B could spuriously start and valves ENHV0006 and ENHV0012 could open, causing full flow containment spray. Pump PEN01B can be stopped by placing hand switch ENHIS0009 in pull-to-lock. Pump PEN01A can be stopped by opening breaker NB0102 in fire area C-9.

Table C-21-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-21

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	A containment entry may be required to close SI Accumulator injection valves EPHV8808A and EPHV8808C if these valves are unresponsive from the control room. The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig.
FB	Auxiliary Steam	R, H	Valve FBHV0081 could be affected. This component is not required if a fire occurs in fire area C-21.
FC	Auxiliary Turbines	R, H, P	Valve FCHV0003 and level switch FCLSH0003 could be affected. These components are not required if a fire occurs in fire area C-21. Valve FCFV0005 may be affected. The MSIVs can be closed using all-close hand switch ABHS0079.
GD	ESW Pump House HVAC	S	Train A ESW pump room ventilation system could be affected. Train B ESW pump room ventilation system is unaffected.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-21.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD support function associated with this system is satisfied. Train A control room A/C unit SGK04A may be affected. Train B control room A/C unit SGK04B is unaffected. Train A Class 1E electrical equipment room A/C unit SGK05A may be affected. Train B Class 1E electrical equipment room A/C unit SGK05B is unaffected.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-21.
GM	Emergency Diesel Generator Room HVAC	S	Train A EDG room ventilation could be affected. The Train B EDG room ventilation is unaffected.
GN	Containment Coolers	S	The PFSSD support function associated with this system is satisfied. Containment pressure transmitter GNPT0935 and GNPT0937 and pressure indicators GNPI0935 and GNPI0937 could be affected. Containment pressure transmitters GNPT0934 and GNPT0936 and indicators GNPI0934 and GNPI0936 are unaffected. Train A containment cooler fans SGN01A and SGN01C could be affected. Train B containment cooler fans SGN01B and SGN01D are unaffected.
JE	Diesel Fuel Oil	S	Low standpipe level switch JELSL0001C may be affected due to loss of power to RP053AC. This could prevent operation of the Train A diesel fuel oil transfer pump PJE01A on low standpipe level. The Train B diesel fuel oil transfer pump PJE01B is unaffected by a fire in this area.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-21.

Table C-21-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-21

System	System Name	PFSSD Function*	Comments
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-21.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-21.
KJ	Standby Diesel Engine	S	Train A diesel engine may be affected by a fire in this area. Train B diesel engine is unaffected.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-21.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-21.
NB	4.16 kV System	S	Train A Class 1E 4.16 kV switchgear bus NB01 may be affected. Train B Class 1E 4.16 kV switchgear bus NB02 is unaffected.
NE	Standby Diesel Generator	S	Train A diesel generator may be affected by a fire in this area. Train B diesel generator is unaffected.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function associated with the load shed/emergency load sequencing system is satisfied. Cables associated with two of the four undervoltage (UV) relays and degraded voltage potential transformers on Train A are run in fire area C-21. Cables associated with two of the four UV relays and degraded voltage potential transformers on Train B are run in fire area C-21. Emergency load shed/sequencer operates when 2/4 UV relays sense undervoltage on the bus. A spurious UV signal will cause the load shedder/sequencer to actuate and start the associated diesel generator. A true UV condition will actuate the two unaffected UV relays. Train B off-site power remains available.
NG	480V Load Centers and MCCs	S	Loss of power to NB01 will result in a loss of power to Train A 480 V load centers and MCCs. Redundant Train B 480 V load centers and MCCs are unaffected.
NK	125VDC	S	Train A class 1E 125 VDC power could be disrupted to control room panels RL001/RL002, RL005/RL006, RL017/RL018, RL019/RL020 and RL021/RL022. The normal source of power to NK01 and NK03, through the Train A 480 V distribution system, could be disrupted. 125 VDC battery sets NK011 and NK013 are unaffected. Train B class 1E 125 VDC power is unaffected.
NN	120VAC	S	The backup source of power to Train A Class 1E electrical distribution switchboards NN01 and NN03 could be affected. The normal source of power to NN01 and NN03 are unaffected due to the availability of 125 VDC battery sets NK011 and NK013. Train B Class 1E electrical distribution switchboards NN02 and NN04 are unaffected.

Table C-21-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-21

System	System Name	PFSSD Function*	Comments
PA	13.8kV	S	Breakers PA0105 and PA0106 could be affected by a fire in this area. Redundant capability is available.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-21.
PG	480V Load Centers and MCCs	S	Loss of all power on bus NB01 will result in Train A PG busses losing power. Off-site and on-site power to NB02 and Train B PG busses is unaffected. Breakers PG1101 and PG1901 could be affected. Redundant capability is available.
PK	125VDC	S	Battery charger PK21 could be affected. Battery charger PK22 is unaffected.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-21.
PN	120VAC	S	Power to non-class 1E 120 VAC switchboard PN07 may be affected. Non-class 1E 120 VAC switchboard PN08 is unaffected.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-21.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-21.
RL	Control Room MCB	S	Separation groups 1 and 5 power supplies to a number of RL panels could be disrupted. Power is available from separation groups 4 and 6 power supplies to energize redundant Train B components.
RP	Miscellaneous Control Panels	R, M, H, P, S	Train A components and cables associated with this system could be affected. Train B components and cables associated with this system are unaffected. Power to panel RP043 could be affected. See SC system discussion for details. Power to panels RP053A and RP053D could be affected. Power to panels RP053B and RP147 is unaffected. Power to RP060 could be affected. RP060 is not required for PFSSD if a fire occurs in fire area C-21. 120 VAC control power to the automatic and manual start circuits in panel RP068 for Train A ESW pump room supply fan CGD01A could be affected. Train B ESW components are unaffected.
SA	ESFAS	S	Auxiliary feedwater low suction pressure (LSP) signal monitored by panel SA036A could be affected. Auxiliary feedwater LSP signals monitored by panels SA036B and SA036C are unaffected. Status panel input for GKHZ0029A/B, SGK04A and SGK05A could be affected. Status panel input for redundant Train B components is unaffected.

Table C-21-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-21

System	System Name	PFSSD Function*	Comments
SB	Reactor Protection System	R, S	RPS Channels 1 and 3 could be affected. RPS Channels 2 and 4 are unaffected. Train A reactor trip switchgear SB0102A could be affected such that a reactor trip occurs or a manual trip on Train A is prevented. Train B reactor trip switchgear cabinet SB102B is unaffected.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-21.
SE	Ex-Core Neutron Monitoring	R, P	Source range monitor SENE0031 and SR monitor signal processor SENY0060B could be affected. Source range indication on SENI0032 could be affected. Source range monitoring remains available using SENY0061A/B and associated indicator.
SY	Switchyard	S	Cable 15SY134 could be damaged, causing a loss of one of the off-site power feeders (13-48) to NB01. Off-site power to NB02 is unaffected.
UU	Supervisory System	S	Cable 15UU003 could be damaged, causing a loss of one of the off-site power feeders (13-8) to NB01. Off-site power to NB02 is unaffected.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in fire area C-21. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs

It may be necessary to fail close ABPV0001 by isolating air and nitrogen to the valve using KAV1435 (air) and KAV1364 (Nitrogen) then venting air from the regulator. These valves are located in fire area A-23 and emergency lighting is available.

It may be necessary to close ABPV0003 using local controller ABFHC0003 in room 1509 (fire area A-23). Emergency lighting is provided, and access is available without traversing fire area C-21.

3.1.2 **Isolation of Letdown** (OMA, refer to E-1F9900)

A fire in area C-21 could prevent valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B, and BGHV8149C from being closed using their respective hand switches in the control room. If this occurs, isolate instrument air by closing valve KAV0201 in fire area A-25 to fail the valves closed.

3.1.3 **Containment Spray** (OMA, refer to E-1F9900)

Containment spray pump PEN01A could spuriously start and valve ENHV0006 could open, causing containment spray. The pump can be stopped by opening breaker NB0102 in fire area C-9.

3.1.4 **Normal Pressurizer Spray** (OMA, refer to E-1F9900)

Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, the valves can be closed by closing valve KAV0201 in fire area A-25. Pressurizer pressure indication is available using BBPI0456 and BBPI0458 located on RL002.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Main Steam Isolation Valves and MSIV Bypass Valves

The capability to isolate the MSIVs and bypass valves using hand switch ABHS0080 may be affected. The MSIVs and bypass valves can be isolated using hand switch ABHS0079.

3.2.2 Main Feedwater Isolation Valves

The capability to isolate the MFIVs using hand switch AEHS0080 may be affected. Isolate the MFIVs using hand switch AEHS0081.

3.2.3 Safety Injection and Containment Spray

A spurious Safety Injection Signal (SIS) can be mitigated by consulting EMG E-0 and terminating the spurious SIS.

Containment spray pump PEN01B could spuriously start and valve ENHV0012 could open, causing containment spray. Pump PEN01B can be stopped by placing hand switch ENHIS0009 in pull-to-lock.

3.2.4 Auxiliary Feedwater

If steam generator A ARV ABPV0001 and steam generator C ARV ABPV0003 control is lost, use the Turbine Driven Auxiliary Feedwater Pump to supply steam generator B and the Train B Motor Driven Auxiliary Feedwater Pump to supply steam generator D.

3.2.5 Component Cooling Water

Train A CCW could be affected by a fire in this area. If this occurs, swap to Train B CCW using normal operating procedures if Train B CCW is not already running. Loss of CCW flow to the RCP thermal barriers can be diagnosed using flow indicator EGFI0129 on panel RL020.

3.2.6 Reactor Coolant Pump Seal Cooling

Thermal barrier cooling could be affected. RCP seal injection could temporarily be disrupted until the Train B CCP is lined up. The Train B CCP can be started and lined up to provide seal injection from the control room. RCP seal flow indication is available using BGFI0215B.

3.2.7 Pressurizer PORV/Block Valve

Pressurizer PORV BBPCV0455A could spuriously open and block valve BBHV8000A may not close. If this occurs, Operators can close the PORV by placing BBHIS0455A in the CLOSE position. Pressurizer pressure indication is available using BBPI0456 and BBPI0458 located on RL002.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR

Valve EJHV8701B may need to be manually opened or a cold shutdown repair made when aligning Train B RHR for shutdown cooling.

3.3.2 Safety Injection Accumulators

A containment entry may be required to close SI Accumulator injection valves EPHV8808A and EPHV8808C if these valves are unresponsive from the control room. The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig.

4.0 CONCLUSION

With some exceptions, redundant Post Fire Safe Shutdown capability exists if a severe fire occurs in fire area C-21. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-21.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-21

PFSSD components (S. in E-15000) located in fire area C-21 are shown in Table C-21-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table C-21-3.

Table C-21-3
PFSSD Components Located in Fire Area C-21

Room #	PFSSD Component	Component Description	Evaluation Section	Comments
3501	PN310	120 VAC Distribution Panel	5.1.1	Power to RP043 and RP047

5.1.1 120 VAC Distribution Panel PN310

120 VAC distribution panel PN310 supplies redundant power to NSSS control panels RP043 and RP047. 120 VAC distribution panel PN410 is a second source of power to RP043 and RP047.

Inverter PN03 supplies power to 120 VAC distribution panel PN310 (via cables 15PNY02AA and 15PNY02AB), which in turn supplies redundant 120 VAC power to NSSS control cabinets RP043 and RP047. Cable 15SCY12EA provides primary power to RP043 from breaker PN31001 and cable 15SCY12FA provides backup power to RP047 from breaker PN31002. For PFSSD, cabinet RP043 houses relays BGLCV0459X and BGLCV0460X, which are associated with letdown isolation valves BGLCV0459 and BGLCV0460, respectively. Cabinet RP047 includes controls for pressurizer PORVs and pressurizer spray.

Damage to cables 15PNY02AA and/or 15PNY02AB will disrupt power to panel PN310. Redundant power to RP043 and RP047 is available from 120 VAC distribution panel PN410. Therefore, loss of power to PN310 will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-1F9421, DCP 13324

5.2 PFSSD CABLE EVALUATION

Table C-21-4 lists all the PFSSD cables (S. in E-15000) located in fire area C-21. The applicable evaluation section is also listed in Table C-21-4.

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ABI20EA	3501	ABPT0001	I	5.2.1	SG A ARV ABPV0001 Pressure Transmitter
11ABI20EB	3501	ABPV0001	I	5.2.1	SG A Atmospheric Relief Valve
11ABI20EC	3501	ABPV0001	I	5.2.1	SG A ARV Press Controller at RP118A
11ABI20ED	3501	ABPV0001	I	5.2.1	SG A ARV Press Controller at RP118A
11ABI20EE	3501	ABPY0001	I	5.2.1	SG A ARV ABPV0001 I/P Converter
11ABI21JA	3501	ABPT0514	I	5.2.2	Steam Generator A Pressure Transmitter
11ABI21MA	3501	ABPT0524	I	5.2.2	Steam Generator B Pressure Transmitter
11ABI21RA	3501	ABPT0534	I	5.2.2	Steam Generator C Pressure Transmitter
11ABI21UA	3501	ABPT0544	I	5.2.2	Steam Generator D Pressure Transmitter
11ABK23AE	3501	ABHV0012, ABHV0015, ABHV0018, ABHV0021	C	5.2.3	MSIV Bypass Valves
11ABK23AF	3501	ABHS0080	C	5.2.3	MSIV and MSIV Bypass Valve Hand Switch
11ABK23AG	3501	ABHV0012, ABHV0015, ABHV0018, ABHV0021	C	5.2.3	MSIV Bypass Valves
11ABK26AB	3501	ABHS0080	C	5.2.3	MSIV and MSIV Bypass Valve Hand Switch
11ABK28AH	3501	ABHV0014	C	5.2.4	Loop 1 Main Steam Iso Valve
11ABK28BH	3501	ABHV0020	C	5.2.4	Loop 3 Main Steam Iso Valve
11ABK29AH	3501	ABHV0017	C	5.2.4	Loop 2 Main Steam Iso Valve
11ABK29BH	3501	ABHV0011	C	5.2.4	Loop 4 Main Steam Iso Valve
11ABK30BB	3501	SA075A	P	5.2.4 5.2.6	125 VDC to MSFIS Cabinet SA075A from NK5119

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11AEI08AB	3501	AELT0501	I	5.2.5	SG A Wide Range Level Transmitter
11AEI08BB	3501	AELT0529	I	5.2.5	SG B Narrow Range Level Transmitter
11AEI08CB	3501	AELT0539	I	5.2.5	SG C Narrow Range Level Transmitter
11AEI12AB	3501	AELT0551	I	5.2.5	SG A Narrow Range Level Transmitter
11AEI12DB	3501	AELT0554	I	5.2.5	SG D Narrow Range Level Transmitter
11AEK14AB	3501	AEHS0080	C	5.2.6	MFIV Hand Switch
11AEK16AH	3501	AEFV0039	C	5.2.6	Steam Generator A Feedwater Isolation Valve
11AEK16BH	3501	AEFV0041	C	5.2.6	Steam Generator C Feedwater Isolation Valve
11AEK17AH	3501	AEFV0040	C	5.2.6	Steam Generator B Feedwater Isolation Valve
11AEK17BH	3501	AEFV0042	C	5.2.6	Steam Generator D Feedwater Isolation Valve
11ALB01AB	3501	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AC	3501	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AD	3501	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AG	3501	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AR	3501	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AS	3501	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AT	3501	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AV	3501	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AW	3501	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALG02BC	3501	ALHV0035	C	5.2.7	CST to MDAFP A Suction
11ALG02BE	3501	ALHV0035	C	5.2.7	CST to MDAFP A Suction
11ALG02CC	3501	ALHV0036	C	5.2.7	CST to TDAFP Suction
11ALG02CE	3501	ALHV0036	C	5.2.7	CST to TDAFP Suction

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ALG04BC	3501	ALHV0031	C	5.2.7	ESW to MDAFP A Suction
11ALG04BE	3501	ALHV0031	C	5.2.7	ESW to MDAFP A Suction
11ALG04CC	3501	ALHV0032	C	5.2.7	ESW A to TDAFP Suction
11ALG04CE	3501	ALHV0032	C	5.2.7	ESW A to TDAFP Suction
11ALI03AA	3501	ALHV0009	I	5.2.7	MDAFP A to SG B
11ALI03AC	3501	ALHV0009	I	5.2.7	MDAFP A to SG B
11ALI03AD	3501	ALHV0009	I	5.2.7	MDAFP A to SG B
11ALI03AE	3501	ALHV0009	I	5.2.7	MDAFP A to SG B
11ALI03AF	3501	ALHV0009	I	5.2.7	MDAFP A to SG B
11ALI03BA	3501	ALHV0011	I	5.2.7	MDAFP A to SG C
11ALI03BC	3501	ALHV0011	I	5.2.7	MDAFP A to SG C
11ALI03BD	3501	ALHV0011	I	5.2.7	MDAFP A to SG C
11ALI03BE	3501	ALHV0011	I	5.2.7	MDAFP A to SG C
11ALI03BF	3501	ALHV0011	I	5.2.7	MDAFP A to SG C
11ALI05AA	3501	ALHV0006	I	5.2.7	TDAFP to SG D
11ALI05AC	3501	ALHV0006	I	5.2.7	TDAFP to SG D
11ALI05AD	3501	ALHV0006	I	5.2.7	TDAFP to SG D (ALHY0006)
11ALI05AE	3501	ALHV0006	I	5.2.7	TDAFP to SG D
11ALI05AF	3501	ALHV0006	I	5.2.7	TDAFP to SG D
11ALI05BA	3501	ALHV0008	I	5.2.7	TDAFP to SG A
11ALI05BC	3501	ALHV0008	I	5.2.7	TDAFP to SG A
11ALI05BD	3501	ALHV0008	I	5.2.7	TDAFP to SG A (ALHY0008)
11ALI05BE	3501	ALHV0008	I	5.2.7	TDAFP to SG A

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ALI05BF	3501	ALHV0008	I	5.2.7	TDAFP to SG A
11ALI07JA	3501	ALPT0025	I	5.2.7	MDAFP A Suction Pressure
11ALI07JB	3501	ALPT0025	I	5.2.7	MDAFP A Suction Pressure
11ALI08AA	3501	ALPT0037	I	5.2.7	ESFAS AFW Low Suction Press Transmitter
11ALI08AC	3501	ALPT0037	I	5.2.7	ESFAS AFW Low Suction Press Transmitter
11ALI09BA	3501	ALFT0009	I	5.2.7	Aux Feedwater Flow to SG B
11ALI09CA	3501	ALFT0011	I	5.2.7	Aux Feedwater Flow to SG C
11ALK01AA	3501	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALY09CD	3501	ALHV0009	C	5.2.7	Train A MDAFP to SG B
11ALY09DD	3501	ALHV0011	C	5.2.7	Train A MDAFP to SG C
11BBG03AC	3501	BBHV0013	C	5.2.20	RCP A Thermal Barrier Return Iso Valve
11BBG03AD	3501	BBHV0013	C	5.2.20	RCP A Thermal Barrier Return Iso Valve
11BBG03BC	3501	BBHV0014	C	5.2.20	RCP B Thermal Barrier Return Iso Valve
11BBG03BD	3501	BBHV0014	C	5.2.20	RCP B Thermal Barrier Return Iso Valve
11BBG03CC	3501	BBHV0015	C	5.2.20	RCP C Thermal Barrier Return Iso Valve
11BBG03CD	3501	BBHV0015	C	5.2.20	RCP C Thermal Barrier Return Iso Valve
11BBG03DC	3501	BBHV0016	C	5.2.20	RCP D Thermal Barrier Return Iso Valve
11BBG03DD	3501	BBHV0016	C	5.2.20	RCP D Thermal Barrier Return Iso Valve
11BBG39AC	3501	BBHV8000A	C	5.2.8	Pressure PORV BBPCV0455A Block Valve
11BBG39AE	3501	BBHV8000A	C	5.2.8	Pressure PORV BBPCV0455A Block Valve
11BBG39AH	3501	BBHV8000A	C	5.2.8	Pressure PORV BBPCV0455A Block Valve
11BBI15EB	3501	BBPT0405	I	5.2.9	RCS Wide Range Hot Leg Pressure
11BBI15HB	3501	BBTE0413A	I	5.2.10	RCS Loop 1 Hot Leg Temp (WR)

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BBI15JB	3501	BBTE0423A	I	5.2.10	RCS Loop 2 Hot Leg Temp (WR)
11BBI15KB	3501	BBTE0443B	I	5.2.10	RCS Loop 4 Cold Leg Temp (WR)
11BBI15LB	3501	BBTE0433B	I	5.2.10	RCS Loop 3 Cold Leg Temp (WR)
11BBI16KB	3501	BBPT0455	I	5.2.2 5.2.8 5.2.39	Pressurizer Pressure Transmitter
11BBI16PB	3501	BBLT0459	I	5.2.11	Pressurizer Level Transmitter (NR)
11BBI28AA	3501	BBFT0017	I	5.2.20	BBHV0013 Flow Control
11BBI28BA	3501	BBFT0018	I	5.2.20	BBHV0014 Flow Control
11BBI28CA	3501	BBFT0019	I	5.2.20	BBHV0015 Flow Control
11BBI28DA	3501	BBFT0020	I	5.2.20	BBHV0016 Flow Control
11BBK30AA	3501	BBHV8001A	C	5.2.12	RX Vessel Head Vent Solenoid Valve
11BBK30CA	3501	BBHV8002A	C	5.2.12	RX Vessel Head Vent Solenoid Valve
11BBK40AE	3501	BBPCV0455A	C	5.2.8	Pressurizer PORV
11BBK40AK	3501	BBPCV0455A	C	5.2.8	Pressurizer PORV
11BBK40AM	3501	BBPCV0455A	C	5.2.8	Pressurizer PORV
11BBK40AN	3501	BBPCV0455A	C	5.2.8	Pressurizer PORV
11BGB01AB	3501	DPBG05A	C	5.2.13	Train A CCP Motor
11BGB01AE	3501	DPBG05A	C	5.2.13	Train A CCP Motor
11BGG11BC	3501	BGHV8106	C	5.2.14	Charging Pumps To Regenerative HX Iso
11BGG11CC	3501	BGHV8110	C	5.2.13	CCP A Mini-Flow Valve
11BGG11CD	3501	BGHV8110	C	5.2.13	CCP A Mini-Flow Valve
11BGG12AC	3501	BGLCV0112B	C	5.2.15	VCT Outlet Valve

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BGG12AE	3501	BGLCV0112B	C	5.2.15	VCT Outlet Valve
11BGG52AC	3501	BGHV8357A	C	5.2.13	CCP A Discharge to RCP Seals
11BGI51AA	3501	BGFT0215A	I	5.2.13	RCP Seal Injection Total Flow Transmitter
11BGI51CA	3501	BGLT0112	I	5.2.15	VCT Level Transmitter
11BGK48CB	3501	BGHV8153A	C	5.2.16	Excess Letdown Isolation
11BGK48DB	3501	BGHV8154A	C	5.2.16	Excess Letdown Isolation
11BGQ11CA	3501	BGHIS8110	C	5.2.13	CCP A Mini-Flow Valve HIS
11BNG01AC	3501	BNLCV0112D	C	5.2.17	RWST to CCP A Suction Valve
11BNG01AD	3501	BNLCV0112D	C	5.2.17	RWST to CCP A Suction Valve
11BNG03AC	3501	BNHV8812A	C	5.2.18	RWST to RHR A Suction Valve
11BNI07CA	3501	BNLT0930	I	5.2.18	RWST Level Transmitter
11EFB01SA	3501	DPEF01A	C	5.2.19	Train A ESW Pump Motor
11EFB01SB	3501	DPEF01A	C	5.2.19	Train A ESW Pump Motor
11EFB01SD	3501	DPEF01A	C	5.2.19	Train A ESW Pump Motor
11EFB01SG	3501	DPEF01A	C	5.2.19	Train A ESW Pump Motor
11EFG02AC	3501	EFHV0023	C	5.2.19	ESW A/Service Water Cross Connect Valve
11EFG02AD	3501	EFHV0023	C	5.2.19	ESW A/Service Water Cross Connect Valve
11EFG02AE	3501	EFHV0023	C	5.2.19	ESW A/Service Water Cross Connect Valve
11EFG02AF	3501	EFHV0023	C	5.2.19	ESW A/Service Water Cross Connect Valve
11EFG02BC	3501	EFHV0024	C	5.2.19	ESW B/Service Water Cross Connect Valve
11EFG02BD	3501	EFHV0024	C	5.2.19	ESW B/Service Water Cross Connect Valve
11EFG02BE	3501	EFHV0024	C	5.2.19	ESW B/Service Water Cross Connect Valve
11EFG02BF	3501	EFHV0024	C	5.2.19	ESW B/Service Water Cross Connect Valve

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EFG03CC	3501	EFHV0041	C	5.2.19	ESW A to Service Water Iso Valve
11EFG03CD	3501	EFHV0041	C	5.2.19	ESW A to Service Water Iso Valve
11EFG03CE	3501	EFHV0041	C	5.2.19	ESW A to Service Water Iso Valve
11EFG03DC	3501	EFHV0042	C	5.2.19	ESW B to Service Water Iso Valve
11EFG03DD	3501	EFHV0042	C	5.2.19	ESW B to Service Water Iso Valve
11EFG03DE	3501	EFHV0042	C	5.2.19	ESW B to Service Water Iso Valve
11EFG04AC	3501	EFHV0059	C	5.2.19	Train A CCW Return to ESW UHS
11EFG05AC	3501	EFHV0051	C	5.2.19	ESW A to CCW HX A
11EFG06AC	3501	EFHV0037	C	5.2.19	ESW A to UHS
11EFG07AC	3501	EFHV0031	C	5.2.19	ESW A to CTMT Air Coolers Iso Valve
11EFG08AC	3501	EFHV0049	C	5.2.19	ESW A to CTMT Air Coolers Iso Valve
11EFG09AC	3501	EFHV0033	C	5.2.19	ESW A to CTMT Air Coolers Iso Valve
11EFG09CC	3501	EFHV0045	C	5.2.19	ESW A to CTMT Air Coolers Iso Valve
11EFI08RA	3501	EFPT0001	I	5.2.19	ESW Pump A Discharge Pressure
11EFI08RB	3501	EFPT0001	I	5.2.19	ESW Pump A Discharge Pressure
11EFI11EA	3501	EFFT0053	I	5.2.19	ESW A Flow to Power Block
11EFI11EB	3501	EFFT0053	I	5.2.19	ESW A Flow to Power Block
11EGB01AB	3501	DPEG01A	C	5.2.20	CCW Pump Motor A
11EGB01AC	3501	DPEG01A	C	5.2.20	CCW Pump Motor A
11EGB01AD	3501	DPEG01A	C	5.2.20	CCW Pump Motor A
11EGB01AF	3501	DPEG01A	C	5.2.20	CCW Pump Motor A
11EGB01AG	3501	DPEG01A	C	5.2.20	CCW Pump Motor A
11EGB01AK	3501	DPEG01A	C	5.2.20	CCW Pump Motor A

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EGB01CB	3501	DPEG01C	C	5.2.20	CCW Pump Motor C
11EGB01CC	3501	DPEG01C	C	5.2.20	CCW Pump Motor C
11EGB01CD	3501	DPEG01C	C	5.2.20	CCW Pump Motor C
11EGB01CF	3501	DPEG01C	C	5.2.20	CCW Pump Motor C
11EGB01CG	3501	DPEG01C	C	5.2.20	CCW Pump Motor C
11EGG05AC	3501	EGHV0015	C	5.2.20	CCW A Pump Common Header Return Iso Vlv
11EGG05CC	3501	EGHV0053	C	5.2.20	A Train CCW Supply To Nuclear Aux Comp.
11EGG07AC	3501	EGHV0101	C	5.2.21	CCW A to RHR A Heat Exchanger
11EGG07AD	3501	EGHV0101	C	5.2.21	CCW A to RHR A Heat Exchanger
11EGG09AC	3501	EGHV0058	C	5.2.20	CCW To RCS Iso Valve
11EGG09AD	3501	EGHV0058	C	5.2.20	CCW To RCS Iso Valve
11EGG09DC	3501	EGHV0061	C	5.2.20	CCW Return From RCS Iso Valve
11EGG09DD	3501	EGHV0061	C	5.2.20	CCW Return From RCS Iso Valve
11EGG17BA	3501	EGHV0132	C	5.2.20	Thermal Barrier CCW Return HV-62 By-Pass
11EGG17BB	3501	EGHV0132	C	5.2.20	Thermal Barrier CCW Return HV-62 By-Pass
11EGG18AC	3501	EGHV0126	C	5.2.20	CCW To RCS Iso Valve
11EGG18AD	3501	EGHV0126	C	5.2.20	CCW To RCS Iso Valve
11EGI13AA	3501	EGPT0077	I	5.2.20	CCW Pumps A & C Discharge Pressure
11EGI19AA	3501	EGFI0128	I	5.2.20	CCW to RCP Flow Indicator
11EGI19AB	3501	EGFT0128	I	5.2.20	CCW to RCP Flow Transmitter
11EGK16AA	3501	EGTV0029	C	5.2.20	CCW A Heat Exchanger Bypass Isolation Valve
11EGK16AB	3501	EGTV0029	C	5.2.20	CCW A Heat Exchanger Bypass Isolation Valve
11EGK16AC	3501	EGTV0029	C	5.2.20	CCW A Heat Exchanger Bypass Isolation Valve

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EJB01AB	3501	DPEJ01A	C	5.2.21	Train A RHR Pump Motor
11EJB01AC	3501	DPEJ01A	C	5.2.21	Train A RHR Pump Motor
11EJG04AC	3501	EJHV8804A	C	5.2.21	RHR A to CVCS CCP Iso Valve NG003CMF4
11EJG05AC	3501	EJHV8701A	C	5.2.21	RCS Hot Leg 1 To RHR Pump A Suction
11EJG05AJ	3501	EJHV8701A	C	5.2.21	RCS Hot Leg 1 To RHR Pump A Suction
11EJG05BC	3501	EJHV8701B	C	5.2.21	RCS Hot Leg 4 To RHR Pump B Suction
11EJG05BJ	3501	EJHV8701B	C	5.2.21	RCS Hot Leg 4 To RHR Pump B Suction
11EJG06AC	3501	EJHV8811A	C	5.2.18	CTMT Recirc Sump To RHR Pump A
11EJG08AC	3501	EJFCV0610	C	5.2.21	RHR A Mini Flow Valve
11EJG09CC	3501	EJHV8809A	C	5.2.21	RHR To ACCUM INJ Loops 1 & 2 Iso Vlv
11EJG09CD	3501	EJHV8809A	C	5.2.21	RHR To ACCUM INJ Loops 1 & 2 Iso Vlv
11EMB01AB	3501	DPEM01A	C	5.2.22	Train A SI Pump Motor
11EMG02AC	3501	EMHV8803A	C	5.2.23	Train A BIT Inlet Valve
11EMG02AD	3501	EMHV8803A	C	5.2.23	Train A BIT Inlet Valve
11EMK12BA	3501	EMHV8964	C	5.2.23	SI Test Line System Outside CTMT Iso Vlv
11EMK12BB	3501	EMHV8964	C	5.2.23	SI Test Line System Outside CTMT Iso Vlv
11ENB01AB	3501	DPEN01A	C	5.2.24	Containment Spray Pump A Motor
11ENG03AC	3501	ENHV0006	C	5.2.24	Train A Containment Spray Isolation Valve
11ENG03AD	3501	ENHV0006	C	5.2.24	Train A Containment Spray Isolation Valve
11EPG02AE	3501	EPHV8808A	C	5.2.25	Accumulator Tank A Outlet Iso Valve
11EPG02AK	3501	EPHV8808A	C	5.2.25	Accumulator Tank A Outlet Iso Valve SB029C
11EPG02BE	3501	EPHV8808C	C	5.2.25	Accumulator Tank C Outlet Iso Valve
11EPG02BK	3501	EPHV8808C	C	5.2.25	Accumulator Tank C Outlet Iso Valve SB029C

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GDG01AC	3501	DCGD01A	C	5.2.19	Train A ESW Pump Room Supply Fan
11GDI04AA	3501	GDTE0001	I	5.2.19	Train A ESW Pump Room Temperature
11GDI04AB	3501	GDTZ0001A	I	5.2.19	Train A ESW Pump Room Inlet Damper
11GDI04AC	3501	GDTZ0001B	I	5.2.19	Train A ESW Pump Room Recirc Damper
11GDY01AA	3501	GDHIS0001A	C	5.2.19	Train A ESW Pump Room Supply Fan HIS
11GDY01AB	3501	GDHIS0001A	C	5.2.19	Train A ESW Pump Room Supply Fan HIS
11GDY01AC	3501	GDHIS0001A	C	5.2.19	Train A ESW Pump Room Supply Fan HIS
11GKG02AB	3501	SGK04A	C	5.2.26	Train A Control Room A/C Unit
11GKG02AC	3501	SGK04A	C	5.2.26	Control Room A/C Unit A
11GKG02AD	3501	SGK04A	C	5.2.26	Train A Control Room A/C Unit
11GKG02AE	3501	SGK04A	C	5.2.26	Control Room A/C Unit A
11GKG13AB	3501	SGK05A	C	5.2.27	Train A Class 1E Elec Equipment Room Cooler
11GKG13AC	3501	SGK05A	C	5.2.27	Train A Class 1E Elec Equipment Room Cooler
11GKG13AD	3501	SGK05A	C	5.2.27	Train A Class 1E Elec Equipment Room Cooler
11GKG13AE	3501	SGK05A	C	5.2.27	Train A Class 1E Elec Equipment Room Cooler
11GKG13AF	3501	SGK05A	C	5.2.27	Train A Class 1E Elec Equipment Room Cooler
11GKG13AG	3501	SGK05A	C	5.2.27	Train A Class 1E Elec Equipment Room Cooler
11GKG13AJ	3501	SGK05A	C	5.2.27	Train A Class 1E Elec Equipment Room Cooler
11GKY02AA	3501	GKHZ0029A/B	C	5.2.26	Control Room A/C Unit 4A Return and Supply Dampers
11GMG01AB	3501	DCGM01A	C	5.2.28	Train A Diesel Generator Room Supply Fan
11GMG01AD	3501	DCGM01A	C	5.2.28	Train A Diesel Generator Room Supply Fan
11GMI02AA	3501	GMTE0001	I	5.2.28	Train A Diesel Generator Room Temperature Element
11GMI02AB	3501	GMTZ0001A	I	5.2.28	Train A Diesel Generator Room Inlet Damper

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GMI02AC	3501	GMTZ0001B	I	5.2.28	Train A Diesel Generator Room Recirc Damper
11GMK04AA	3501	GMHZ0009	C	5.2.28	Train A Diesel Generator Room Exh Damper
11GMK04AB	3501	GMHZ0009	C	5.2.28	Train A Diesel Generator Room Exh Damper
11GNG02AD	3501	DSGN01A	C	5.2.29	Containment Cooler Fan A Motor
11GNG02AE	3501	DSGN01A	C	5.2.29	Containment Cooler Fan A Motor
11GNG02AF	3501	DSGN01A	C	5.2.29	Containment Cooler Fan A Motor
11GNG02AH	3501	DSGN01A	C	5.2.29	Containment Cooler Fan A Motor
11GNG02AJ	3501	DSGN01A	C	5.2.29	Containment Cooler Fan A Motor
11GNG02AK	3501	DSGN01A	C	5.2.29	Containment Cooler Fan A Motor
11GNG02CD	3501	DSGN01C	C	5.2.29	Containment Cooler Fan C Motor
11GNG02CE	3501	DSGN01C	C	5.2.29	Containment Cooler Fan C Motor
11GNG02CF	3501	DSGN01C	C	5.2.29	Containment Cooler Fan C Motor
11GNG02CH	3501	DSGN01C	C	5.2.29	Containment Cooler Fan C Motor
11GNG02CJ	3501	DSGN01C	C	5.2.29	Containment Cooler Fan C Motor
11GNG02CK	3501	DSGN01C	C	5.2.29	Containment Cooler Fan C Motor
11GNI05AA	3501	GNPT0937	I	5.2.2	Containment Pressure Transmitter
11JEG01AB	3501	DPJE01A	C	5.2.28	Train A Emerg Fuel Oil Transfer Pump Motor
11JEG01AE	3501	DPJE01A	C	5.2.28	Train A Emerg Fuel Oil Transfer Pump Motor
11JEI04AA	3501	JELT0001	I	5.2.28	Train A Emergency Fuel Oil Day Tank Level
11KAK02AA	3501	KAFV0029	C	5.2.40	Containment Instrument Air Supply Valve
11KAK02AB	3501	KAFV0029	C	5.2.40	Containment Instrument Air Supply Valve
11KJK01AH	3501	KKJ01A	C	5.2.28	Train A Emergency Diesel Engine
11KJK01AK	3501	KKJ01A	C	5.2.28	Train A Emergency Diesel Engine

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11KJK06AE	3501	KKJ01A	I	5.2.28	Train A Emergency Diesel Engine
11NBB01AB	3501	NBHS0010	C	5.2.30	NB01 Synchro-scope/Selector Switch
11NBB01AD	3501	NBHS0010	C	5.2.30	NB01 Synchro-scope/Selector Switch
11NBB01AE	3501	NBHS0010	C	5.2.30	NB01 Synchro-scope/Selector Switch
11NBB01AF	3501	NBHS0010	C	5.2.30	NB01 Synchro-scope/Selector Switch
11NBB02AC	3501	NB00109	C	5.2.30	Bus NB01 Monitoring and Control
11NBB03BC	3501	NB00112	C	5.2.30	Bus NB01 Monitoring and Control
11NBB12AA	3501	NB00112	C	5.2.30	Bus NB01 Incoming Feeder Breaker DC Control
11NBB12AB	3501	NB00112	C	5.2.30	Bus NB01 Incoming Feeder Breaker DC Control
11NBB12AC	3501	NB00112	C	5.2.30	Bus NB01 Incoming Feeder Breaker DC Control
11NBB12AE	3501	NB00112	C	5.2.30	Bus NB01 Incoming Feeder Breaker DC Control
11NBB12AF	3501	NB00112	C	5.2.30	Bus NB01 Incoming Feeder Breaker DC Control
11NBB12AG	3501	NB00112	C	5.2.30	Bus NB01 Incoming Feeder Breaker DC Control
11NBB13AA	3501	NB00109	C	5.2.30	XNB02 to Bus NB01 Crosstie Feeder Breaker
11NBB13AC	3501	NB00109	C	5.2.30	XNB02 to Bus NB01 Crosstie Feeder Breaker
11NEB01AG	3501	NE107	C	5.2.28	Train A Emergency Diesel Generator
11NEB10AA	3501	NB00111	C	5.2.28	Train A EDG to NB01 Feeder Breaker (NEHIS0025)
11NEB10AD	3501	NB00111	C	5.2.28	Train A EDG to NB01 Feeder Breaker (NEHIS0025)
11NEK12AD	3501	KKJ01A	C	5.2.28	Train A Emergency Diesel Generator
11NEK12AF	3501	NE107	I	5.2.28	Train A Emergency Diesel Generator
11NEK12AJ	3501	NE107	C	5.2.28	Train A Emergency Diesel Generator
11NFK01AA	3501	NF039C	P	5.2.36	Load Shed / Sequencer Ch 1 & 4 Term
11NFK01CA	3501	NF039A	C	5.2.36	Load Shed / Sequencer Ch 1 Logic

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11NFK01DA	3501	NF039B	C	5.2.36	Load Shed / Sequencer Ch 4 Logic
11NFY01AA	3501	NF039A	P	5.2.36	Load Shed / Sequencer Ch 1 Logic
11NFY01BA	3501	NF039B	P	5.2.36	Load Shed / Sequencer Ch 4 Logic
11NFY01EA	3501	NF039A	C	5.2.36	Load Shed / Sequencer Ch 1 Logic
11NFY01FA	3501	NF039B	C	5.2.36	Load Shed / Sequencer Ch 4 Logic
11NGB10AB	3501	NB00113	C	5.2.31	NG01 Feeder Breaker (NGHIS0001)
11NGB10BB	3501	NB00110	C	5.2.31	NG03 Feeder Breaker (NGHIS0002)
11NGB10SA	3501	NB00116	C	5.2.31	NG05E Feeder Breaker (NGHIS0003)
11NGG11AA	3501	NG00101	C	5.2.31	Bus NG01 Feeder Breaker Control (NGHIS0009)
11NGG11BA	3501	NG00301	C	5.2.31	Bus NG03 Feeder Breaker Control (NGHIS0011)
11PKK10AA	3501	PK21	C	5.2.31	Train A 125 VDC Non-Class 1E Battery Chgr
11PKK10AB	3501	PK21	C	5.2.31	NG0102 Breaker Control
11RLK01AA	3501	NK04119	P	5.2.32	125 VDC to RC & Support Sys Control Panel (RL001/RL002)
11RLK01CA	3501	NK04112	P	5.2.32	125 VDC to ESF Control Panel (RL017/RL018)
11RLK01DA	3501	NK04113	P	5.2.32	125 VDC to ESF Control Panel (RL019/RL020)
11RLK01EA	3501	NK05109	P	5.2.32	125 VDC to Reactor Auxiliary Control Panel (RL021/RL022)
11RPY09CA	3501	RP053AC	P	5.2.33	120 VAC to BOP Instrumentation Rack from NN0116
11RPY09DA	3501	RP053AC	P	5.2.33	120 VAC to BOP Instrumentation Rack from NN0120
11RPY10BA	3501	RP068	P	5.2.19	120 VAC to BOP Control Panel from NG01ACR1
11SAK21AA	3501	SA036A	P	5.2.7	125 VDC to ESFAS Channel 1 Termination Cab from NK5110

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11SAY21AA	3501	SA036A	P	5.2.7	120 VAC to ESFAS Channel 1 Termination Cab from NN0103
11SAZ19EA	3501	GKHZ0029A/B	C	5.2.26	SGK04A Supply/Return Dampers Status Panel Input
11SAZ19JA	3501	SGK04A	C	5.2.26	Status Panel SA066A Input from SGK04A
11SAZ19KA	3501	SGK05A	C	5.2.27	Status Panel SA066A Input from SGK05A
11SBS01AA	3501	SB029A	I	5.2.34	Solid State Protection Sys Train A Input Panel
11SBS01AB	3501	SB029A	I	5.2.34	Solid State Protection Sys Train A Input Panel
11SBS01AC	3501	SB029A	I	5.2.34	Solid State Protection Sys Train A Input Panel
11SBS01AD	3501	SB029A	P	5.2.34	120 VAC to SSPS A Input Panel from NN0110
11SBS02AA	3501	SB032A	I	5.2.34	Solid State Protection Sys Train B Input Panel
11SBS02AC	3501	SB032A	I	5.2.34	Solid State Protection Sys Train B Input Panel
11SBS02AD	3501	SB032A	P	5.2.34	120 VAC to SSPS B Input Panel from NN0109
11SBS05AE	3501	SB029D	P	5.2.34	120 VAC to SSPS A Output Panel from NN0112
11SBS05AF	3501	SB029D	P	5.2.34	125 VDC to SSPS A Output Panel from NK4118
11SBS08AA	3501	BBLI0459A BGLI0112 BGFI0215A	I	5.2.11 5.2.15 5.2.13	Pressurizer Level Indication VCT Level Indication RCP Seal Total Flow Indication
11SBS08AB	3501	BNLI0930 GNPI0937	I	5.2.18 5.2.2	RWST Level Indication Containment Pressure Indication
11SBS08AC	3501	BBTI0413A BBTI0423A BBPI0405	I	5.2.10 5.2.10 5.2.9	RCS Loop 1 Hot Leg Temperature RCS Loop 2 Hot Leg Temperature RCS Narrow Range Pressure

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11SBS08AD	3501	ABPI0514A ABPI0524A ABPI0534A ABPI0544A AELI0501 AELI0529 AELI0539	I	5.2.5	Steam Generator A Pressure Steam Generator B Pressure Steam Generator C Pressure Steam Generator D Pressure Steam Generator A WR Level Steam Generator B NR Level Steam Generator C NR Level
11SBS08CB	3501	BNLI0932 GNPI0935	I	5.2.18 5.2.2	RWST Level Indication Containment Pressure Indication
11SBS08CC	3501	ABPI0526A ABPI0536A AELI0503 AELI0518 AELI0528 AELI0538 AELI0548	I	5.2.5	Steam Generator B Pressure Steam Generator C Pressure Steam Generator C WR Level Steam Generator A NR Level Steam Generator B NR Level Steam Generator C NR Level Steam Generator D NR Level
11SBS12AA	3501	SB102A	C	5.2.34	Reactor Trip Switchgear A
11SBS12AC	3501	SB102A	C	5.2.34	Reactor Trip Switchgear A
11SBY09CA	3501	SB038	P	5.2.34	120 VAC to Process Protection Set 1 Panel from NN0111
11SES01AA	3501	SE054A	P	5.2.35	120 VAC to Nuclear Instrumentation Sys Rack 1 Panel from NN0113
11SES01BB	3501	SE054A	I	5.2.35	Nuclear Instrumentation Sys Rack 1 Panel
11SES01BC	3501	SE054A	I	5.2.35	Nuclear Instrumentation Sys Rack 1 Panel
11SES07BB	3501	SENY0060B	I	5.2.35	Source Range Monitor
13ABI20GA	3501	ABPT0003	I	5.2.1	SG C ARV ABPV0003 Pressure Transmitter

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
13ABI20GB	3501	ABPV0003	I	5.2.1	SG C Atmospheric Relief Valve
13ABI20GC	3501	ABPV0003	I	5.2.1	SG C ARV Press Controller at RP118A
13ABI20GD	3501	ABPV0003	I	5.2.1	SG C ARV Press Controller at RP118A
13ABI20GE	3501	ABPY0003	I	5.2.1	SG C ARV ABPV0003 I/P Converter
13ABI21PA	3501	ABPT0526	I	5.2.2	SG B Steam line Pressure Transmitter
13ABI21TA	3501	ABPT0536	I	5.2.2	SG C Steam line Pressure Transmitter
13AEI08GB	3501	AELT0503	I	5.2.5	SG C Wide Range Level Transmitter
13AEI08HB	3501	AELT0518	I	5.2.5	SG A Narrow Range Level Transmitter
13AEI08JB	3501	AELT0528	I	5.2.5	SG B Narrow Range Level transmitter
13AEI08KB	3501	AELT0538	I	5.2.5	SG C Narrow Range Level Transmitter
13AEI08LB	3501	AELT0548	I	5.2.5	SG D Narrow Range Level Transmitter
13BBI16MB	3501	BBPT0457	I	5.2.2 5.2.8 5.2.39	Pressurizer Pressure Transmitter
13GNI05CA	3501	GNPT0935	I	5.2.2	Containment Pressure Transmitter
13NFK01CA	3501	NF039A	C	5.2.36	Load Shed / Sequencer Ch 1 Logic
13NFK01DA	3501	NF039B	C	5.2.36	Load Shed / Sequencer Ch 4 Logic
13NFY01EA	3501	NF039A	P	5.2.36	Load Shed / Sequencer Ch 1 Logic
13NFY01FA	3501	NF039B	P	5.2.36	Load Shed / Sequencer Ch 4 Logic
13NFY01GA	3501	NF039A	C	5.2.36	Load Shed / Sequencer Ch 1 Logic
13NFY01HA	3501	NF039B	C	5.2.36	Load Shed / Sequencer Ch 4 Logic
13RPY09AA	3501	RP053DB	P	5.2.33	120 VAC to BOP Instrumentation Rack from NN0307
13SBS01CA	3501	SB029A	I	5.2.34	Solid State Protection Sys Train A Input Panel

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
13SBS01CB	3501	SB029A	I	5.2.34	Solid State Protection Sys Train A Input Panel
13SBS01CD	3501	SB029A	P	5.2.34	120 VAC to SSPS A Input Panel from NN0309
13SBS02CA	3501	SB032A	I	5.2.34	Solid State Protection Sys Train B Input Panel
13SBS02CB	3501	SB032A	I	5.2.34	Solid State Protection Sys Train B Input Panel
13SBS02CD	3501	SB032A	P	5.2.34	120 VAC to SSPS B Input Panel from NN0310
13SBY09EA	3501	SB037	P	5.2.34	120 VAC to Process Protection Set 3 Panel from NN0311
15ABG02AC	3501	ABHV0031	C	5.2.4	Main Steam Supply To MSR A&C 2nd Stage
15ABY04AA	3501	ABFV0023	C	5.2.4	Steam Trap Bypass Valve - Loop 4
15ABY04AB	3501	ABFV0023	C	5.2.4	Steam Trap Bypass Valve - Loop 4
15ABY18BA	3501	ABLV0051	C	5.2.4	Main Steam Header to Steam Dumps Trap Bypass
15ABY18BB	3501	ABLSH0051	C	5.2.4	Main Steam Header to Steam Dumps Trap Bypass Level Switch
15ABY18DA	3501	ABLV0053	C	5.2.4	Main Steam Header to Steam Dumps Trap Bypass
15ABY18DB	3501	ABLSH0053	C	5.2.4	Main Steam Header to Steam Dumps Trap Bypass Level Switch
15ACQ15BA	3501	ACHS0002A ACHS0002B	C	5.2.4	Main Turbine Master Trip Pushbuttons
15BBA01AB	3501	DPBB01A	C	5.2.38	Reactor Coolant Pump A Motor
15BBA01AJ	3501	DPBB01A	C	5.2.38	Reactor Coolant Pump A Motor
15BBA01AL	3501	DPBB01A	C	5.2.38	Reactor Coolant Pump A Motor
15BBA01BB	3501	DPBB01B	C	5.2.38	Reactor Coolant Pump B Motor
15BBA01BJ	3501	DPBB01B	C	5.2.38	Reactor Coolant Pump B Motor
15BBA01BL	3501	DPBB01B	C	5.2.38	Reactor Coolant Pump B Motor

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15BBI19AA	3501	BBPCV0455B	I	5.2.39	Pressurizer Spray Valve
15BBI19BA	3501	BBPCV0455C	I	5.2.39	Pressurizer Spray Valve
15BGK10AA	3501	BGLCV0459	C	5.2.37	Letdown Isolation Valve
15BGK10AC	3501	BGLCV0459	C	5.2.37	Letdown Isolation Valve
15BGK10AD	3501	BGLCV0459	C	5.2.37	Letdown Isolation Valve
15BGK10BA	3501	BGLCV0460	C	5.2.37	Letdown Isolation Valve
15BGK10BC	3501	BGLCV0460	C	5.2.37	Letdown Isolation Valve
15BGK10BD	3501	BGLCV0460	C	5.2.37	Letdown Isolation Valve
15BGK35AA	3501	BGHV8149A	C	5.2.37	Letdown Orifice Isolation Valve
15BGK35AB	3501	BGHV8149A	C	5.2.37	Letdown Orifice Isolation Valve
15BGK35AD	3501	BGHV8149A	C	5.2.37	Letdown Orifice Isolation Valve
15BGK35BA	3501	BGHV8149B	C	5.2.37	Letdown Orifice Isolation Valve
15BGK35BB	3501	BGHV8149B	C	5.2.37	Letdown Orifice Isolation Valve
15BGK35BD	3501	BGHV8149B	C	5.2.37	Letdown Orifice Isolation Valve
15BGK35CA	3501	BGHV8149C	C	5.2.37	Letdown Orifice Isolation Valve
15BGK35CB	3501	BGHV8149C	C	5.2.37	Letdown Orifice Isolation Valve
15BGK35CD	3501	BGHV8149C	C	5.2.37	Letdown Orifice Isolation Valve
15EJI12AA	3501	EJHCV0606	I	5.2.21	RHR A Heat Xchgr Discharge Control Valve (EJHY0606)
15EMK05EA	3501	EMHV8882	C	5.2.23	Boron Injection Downstream Test Line
15FBG12AC	3501	FBHV0081	C	5.2.4	Main Steam/Extraction Steam Xconnect Valve
15FCQ29AE	3501	FCFV0005	C	5.2.41	Steam Generator Feed Pump A Turbine Stop Valve
15FCY08AA	3501	FCHV0003	C	5.2.4	SGFWP Turb A Main Steam line Low Pt Drain
15FCY08AB	3501	FCLSH0003	C	5.2.4	SGFWP Turb A Main Steam line Low Pt Drain Switch

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15FCY35AA	3501	FC169A	P	5.2.41	Steam Generator Feed Pump A Term Cabinet
15GKK31CB	3501	95XGK07	C	5.2.27	SGK05A Fire Signal Isolation
15NBA10AD	3501	NB00112	C	5.2.30	Bus NB01 Incoming Feeder Breaker Control
15PGA10AC	3501	PA0105	C	5.2.42	Load Centers PG11, PG13 and PG25 Fdr Bkr
15PGA10BC	3501	PA0106	C	5.2.42	Load Centers PG15, PG17 and PG19 Fdr Bkr
15PGG13AA	3501	PG1101	C	5.2.42	Load Center PG11 Incoming Feeder Breaker
15PGG13DA	3501	PG1901	C	5.2.42	Load Center PG19 Incoming Feeder Breaker
15PNY02AA	3501	PN310	P	5.1.1	120 VAC Power from PN03 (Hot Side)
15PNY02AB	3501	PN310	P	5.1.1	120 VAC Power from PN03 (Neutral)
15RLK01AA	3501	PK05117	P	5.2.37	125 VDC to RC & Support Sys Control Panel (RL001/RL002)
15RLK01CA	3501	PK06115	P	5.2.30	125 VDC to Site Related Control Panel (RL013/RL014)
15RLK01DA	3501	PK06116	P	5.2.23	125 VDC to ESF Control Panel (RL017/RL018)
15RLY01DA	3501	PN00736	P	5.2.21	120 VAC to ESF Control Panel (RL017/RL018)
15RLY01EA	3501	PN00738	P	5.2.10	120 VAC to Reactor Auxiliary Control Panel (RL021/RL022)
15RLY01HA	3501	PG019GCR2	P	5.2.4	120 VAC to Turbine Generator and Feedwater Control Panel (RL023/RL024)
15RPK09RA	3501	PK05113	P	5.2.30	125 VDC Power to Master Supervisory Station RP060
15SBS06AD	3501	BBPCV0455A	I	5.2.8	Pressurizer PORV
15SBS08AA	3501	BBPI0455A	I	5.2.11	Pressurizer Pressure Indication
15SBS08AE	3501	AELI0551 AELI0554	I	5.2.5	Steam Generator A NR Water Level Steam Generator D NR Water Level
15SBS08CA	3501	BBPI0457	I	5.2.11	Pressurizer Pressure Indication

Table C-21-4
PFSSD Cables Located in Fire Area C-21

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15SBS08ED	3501	BBPCV0455A BBPCV0455B BBPCV0455C	I	5.2.8	Pressurizer Pressure Control
15SBS08GC	3501	BBPCV0455A BBPCV0455B BBPCV0455C	I	5.2.8	Pressurizer Pressure Control
15SCR15RF	3501	BBPCV0455A BBPCV0455B BBPCV0455C	I	5.2.8 5.2.39	Ethernet communication cable from RP047 to RP043
15SCR15RG	3501	BBPCV0455A BBPCV0455B BBPCV0455C	I	5.2.8 5.2.39	Ethernet communication cable from RP047 to RP043
15SCY12EA		RP043	P	5.1.1	Primary 120 VAC power from PN31001 to RP043
15SCY12FA		RP047	P	5.1.1	Backup 120 VAC power from PN31002 to RP047
15SES05AA	3501	SE054A	I	5.2.35	Source Range Monitoring SENE0031
15SES05BA	3501	SE054B	I	5.2.35	Source Range Monitoring SENE0032
15SY134	3501	NB01	C	5.2.30	Off-site Power Breaker 13-48
15UU003	3501	NB01	I	5.2.30	Off-site Power Breaker 13-8

5.2.1 Steam Generator Atmospheric Relief Valves

PFSSD requires at least two steam generator atmospheric relief valves (ARV) be controlled and the other two closed. The ARVs are pneumatically operated using air from the compressed air system (KA) or nitrogen from the nitrogen accumulators. The valves open by pneumatic pressure and close by spring action. The valves are automatically controlled by a pressure transmitter input signal from a pressure transmitter installed on the outlet side of the steam generator. Alternatively, each valve can be controlled manually from the control room or the auxiliary shutdown panel by placing the pressure indicating controller (PIC) in manual.

As discussed in Section 5.2.7, a fire in area C-21 could damage cables and equipment associated with the Train A Motor Driven Auxiliary Feedwater Pump (MDAFP). The Turbine Driven Auxiliary Feedwater Pump (TDAFP) and the Train B MDAFP are available. The TDAFP can be lined up to feed steam generators B and C while the Train B MDAFP can be used to supply auxiliary feedwater to Steam Generators A and D.

Cables associated with steam generators A and C ARVs ABPV0001 and ABPV0003 are run in this area. Damage to these cables could prevent control or isolation of the associated ARV. ARV ABPV0001 can be failed closed by isolating air and nitrogen to the valve using KAV1435 (air) and KAV1364 (Nitrogen) then venting air from the regulator. These valves are located in fire area A-23 and emergency lighting is available. ARV ABPV0003 can be closed using local controller ABFHC0003, also located in fire area A-23.

Based on the above discussion, PFSSD can be achieved by controlling ARVs ABPV0002 and ABPV0004 and locally isolating ARVs ABPV0001 and ABPV0003. The TDAFP can be used to supply steam generator B and the Train B MDAFP can be used to supply steam generator D.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB06A, E-13AB06C, E-13AB20A, E-13AB20B, E-1F9101, J-110-00216, J-110-00217, J-110-00220, J-110-00221, M-12AB01, M-12KA04, M-12KA05

5.2.2 Safety Injection and Containment Spray

Calculation XX-E-013, Appendix 1 (PFSSD Support Section) provides a detailed discussion about the potential PFSSD impact of a spurious safety injection signal (SIS) and spurious containment spray actuation signal (CSAS). This section discusses the specific PFSSD impact if a fire occurs in this area.

Cables associated with containment pressure transmitters GNPT0935 and GNPT0937 and indicators GNPI0935 and GNPI0937 are run in fire area C-21. Consequently, a spurious CSAS due to false high containment pressure can occur if a fire occurs in fire area C-21. However, a spurious SIS due to high containment pressure cannot occur since only one of the three containment pressure SIS initiators have cables located in fire area C-21. Containment pressure indication is available using GNPI0934 and GNPI0936.

Cables associated with BBPT0455 and BBPT0457 are run in fire area C-21. Consequently, a fire in area C-21 can cause a spurious SIS due to false low pressurizer pressure.

Cables associated with steam line pressure transmitters ABPT0514, ABPT0524, ABPT0526, ABPT0534, ABPT0536 and ABPT0544 are run in fire area C-21. Consequently, the two out of

three logic for low steam line pressure initiation of SIS can be satisfied on steam generators B and C if a fire occurs in fire area C-21.

A spurious SIS starts the charging sequence which starts the CCPs and opens the BIT flowpath valves. For a fire in this area, Train B CCP is credited for PFSSD since a number of Train A PFSSD components could be lost. Train B BIT flowpath valves EMHV8801B and EMHV8803B are unaffected and would open on a SIS. The Train B RWST to CCP suction header valve BNLCV0112B is unaffected and would open on a SIS. Also, the Train B CCP mini flow valve BGHV8111 is unaffected and Train B CCW flow to the seal water heat exchanger is unaffected to ensure cooling of the recirc flow and RCP seal return. Train B CCW is also available for the CCP oil cooler. Therefore, the Train B charging pump will not be affected by a spurious SIS caused by a fire in this area.

A start of the credited CCW system (Train B) will not adversely impact the system. The Train B ESW system is unaffected and will start on a spurious SIS, providing necessary cooling water to the CCW heat exchanger.

A start of the AFW pumps will not adversely impact PFSSD. The Train B AFW pump and the TDAFP are credited for a fire in this area. Suction from the CST to the Train B AFW pump is unaffected. Suction from the Train B ESW system to the TDAFP is unaffected but if ALHV0036 spuriously closes suction would be lost to the TDAFP until operators open ALHV0033. The TDAFP does not auto start on a SIS, so damage to the TDAFP will not occur as a result of a spurious SIS. Discharge flow from the Train B AFW pump will either return to the CST or flow to the steam generators through the discharge control valves. Therefore, the Train B AFW pump and the TDAFP are unaffected by a spurious SIS caused by a fire in this area.

A spurious SIS will start both RHR pumps and open the containment sump to RHR pumps isolation valves with a coincident RWST low-low level signal. A spurious RWST low-low level signal is not credible for a fire in area C-21 as discussed in Section 5.2.18. Train A RHR pump minimum flow valve EJFCV0610 could be affected as discussed in Section 5.2.21 and CCW to the Train A RHR heat exchanger could be affected as discussed in Section 5.2.20. Therefore, the Train A RHR pump could be affected by a spurious pump start (due to a SIS) coincident with other component damage that causes the pump to overheat. The Train B RHR pump is unaffected because valve EJFCV0611 and Train B CCW is unaffected.

A spurious Containment Spray Actuation Signal (CSAS) due to spurious high containment pressure can be mitigated by placing CS pump control hand switches ENHIS0003 and ENHIS0009 in pull-to-lock. If Containment spray pump PEN01A does not stop because of control cable damage, the pump can be stopped by opening breaker NB0102 in fire area C-9. These switches are located on control room panel RL017.

Based on the above discussion, a fire in area C-21 could cause a spurious SIS due to low pressurizer pressure and low steam line pressure. A fire in C-21 could also cause a spurious CSAS due to high containment pressure. The spurious SIS and CSAS will not cause damage to credited hot standby or cold shutdown equipment.

References: E-15000, XX-E-013, E-1F9431, E-1F9432, E-1F9433, E-13AB21, E-13BB16, E-13EM01, E-13GN05, M-12AB01, M-12BB02, M-12BN01, M-12EJ01, M-12GN01, M-761-02007, M-761-02068, OFN KC-016, CR 25002

5.2.3 Main Steam Isolation Bypass Valves

PFSSD requires the MSIVs and bypass valves be closed to prevent reactivity addition due to uncontrolled cooldown. The MSIVs and bypass valves are closed from the control room using hand switches ABHS0079 or ABHS0080. The bypass valves are normally closed.

Each of the four MSIV bypass valves (ABHV0012, ABHV0015, ABHV0018 and ABHV0021) has two redundant solenoids that control the position of the associated bypass valve. The bypass valves are normally closed with the solenoids de-energized. Both solenoids need to be energized to open the valve. One of the solenoids on each valve is on separation group 1 (Train A) and are controlled by hand switch ABHS0080. The other solenoids on each valve are on separation group 4 (Train B) and are controlled by hand switch ABHS0079.

Cable 11ABK23AE is associated with steam line isolation signal relay K627. Upon receipt of a steam line isolation signal, the relay contact opens and the bypass valves close. An open circuit in one of the two conductors will produce the same result as a steam line isolation signal, which is desired for PFSSD. A hot short between the conductors will bypass the contact and prevent a steam line isolation signal from closing the valves.

Cable 11ABK23AF is associated with handswitch ABHS0080 on the Train A MSIV bypass valve control circuit. An open circuit in one of the two conductors will de-energize the respective solenoid and close the bypass valves. A hot short between the conductors will bypass the handswitch contact and prevent closure of the valves using the handswitch.

Cable 11ABK23AG is associated with MSIV bypass valves ABHV0012, ABHV0015, ABHV0018 and ABHV0021. The bypass valves are normally closed, which is the desired PFSSD position. In order for the valves to spuriously open, both solenoids on the air line need to be energized. An external cable hot short on cable 11ABK23AG could energize the Train A solenoids but the Train B solenoids are unaffected by a fire in area C-21. In addition, hand switch ABHS0079 is available to ensure the bypass valves are closed. Therefore, a fire in area C-21 will not affect the ability to isolate the MSIV bypass valves.

Cable 11ABK26AB is associated with handswitch ABHS0080 on the Train A MSIV control circuit. An open circuit in one of the two conductors will prevent ABHS0080 from performing its function. A hot short between the conductors will close the MSIVs, which is the desired PFSSD position.

Redundant means are available to ensure the MSIV bypass valves are closed. Hand switch ABHS0079 is unaffected by the fire and can be used to ensure one of the two solenoids on each bypass valve are de-energized.

References: E-15000, XX-E-013, E-13AB23A, E-13AB23B, E-13AB26, E-13AB27, E-1F9101

5.2.4 Steam Generator Main Steam Isolation Valves (MSIVs)

PFSSD requires the MSIVs be closed to prevent reactivity addition due to uncontrolled cooldown. The MSIVs are closed from the control room using all close hand switches ABHS0079 or ABHS0080.

Each MSIV is designed to utilize system fluid (main steam) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main steam. This is done by actuating either all close hand switch ABHS0079 (separation group 4) or ABHS0080 (separation group 1) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MSIV	ABHS0079 (Sep Group 4)		ABHS0080 (Sep Group 1)	
	Solenoids	Cable	Solenoids	Cable
ABHV0011	MV2, MV4, MV6	14ABK28BH	MV1, MV3, MV5	11ABK29BH
ABHV0014	MV2, MV4, MV6	14ABK29AH	MV1, MV3, MV5	11ABK28AH
ABHV0017	MV2, MV4, MV6	14ABK28AH	MV1, MV3, MV5	11ABK29AH
ABHV0020	MV2, MV4, MV6	14ABK29BH	MV1, MV3, MV5	11ABK28BH

All 4 cables associated with the 12 separation group 1 solenoid valves are run in area C-21. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 4 cables associated with hand switch ABHS0079 are unaffected by a fire in area C-21. Therefore, hand switch ABHS0079 is available to close the four MSIVs.

Cable 11ABK30BB provides 125 VDC power to Train A main steam and feedwater isolation system (MSFIS) actuation cabinet SA075A from NK5119. Damage to this cable would disrupt power to the separation group 1 solenoids and close the MSIVs, which is the desired PFSSD position. In addition, the Train B MSFIS is unaffected by the fire and ABHS0079 is available to close the MSIVs.

Cables associated with isolation valves located downstream of the MSIVs are located in this area. These downstream isolation valves are used in the event the MSIVs cannot be closed. Valves ABHV0031, ABFV0023, ABLV0051, ABLV0053, FBHV0081 and FCHV0003 could be affected by a fire in this area. However, as stated in the previous paragraph, the MSIVs can be isolated using hand switch ABHS0079. Therefore, damage to cables associated with these downstream components will have no adverse impact on PFSSD.

Cable 15ACQ15BA is associated with main turbine master trip pushbuttons ACHS0002A and ACHS0002B. These pushbuttons are used for PFSSD to isolate the main turbine stop valves if the MSIVs cannot be closed. As stated previously, the MSIVs can be closed using ABHS0079. Therefore, damage to this cable will have no adverse impact on PFSSD.

Cable 15RLY01HA supplies 120VAC power to MCB RL023/RL024 miscellaneous circuits from PG19GCR217. Several loads are supplied by this power supply, but only eight are PFSSD components. These are ABLV0051, ABLV0053, ABFV0023, ABFV0025, ABFV0027, ABFV0029, FCHV0003, and ABHIS0032 which are components downstream of the Main Steam Isolation Valves (MSIVs). Loss of power to ABLV0051, ABLV0053, ABFV0023, ABFV0025, ABFV0027, ABFV0029 and FCHV0003 could fail the valves open. Loss of power to ABHIS0032 will cause a loss of hand switch indicator lights. However, a fire in area C-21

does not affect the ability to close the MSIVs and MSIV bypass valves using hand switch ABHS0079 in the main control room. Therefore, the MSIV downstream components can fail in an undesired position without any consequence on PFSSD.

Based on the above discussion, hand switch ABHS0079 is available to close the MSIVs in the event of a fire in area C-21.

References: E-15000, XX-E-013, E-13AB23A, E-13AB23B, E-13AB26, E-13AB27, E-13AB28, E-13AB29, E-13AB30, E-13AC15, E-13FB12, E-13RL01, E-13RL07, E-1F9101, E-1F9103, J-104-00295, J-104-00296, M-12AB02

5.2.5 Steam Generator Level and Pressure Indication

The decay heat removal function for PFSSD requires the use of two RCS loops and two Steam Generators. Steam generator (SG) level indication is required to support this function. The available success path if a fire occurs in area C-21 credits MDAFP B supplying SG D and the TDAFP supplying SG B. Therefore, level indication on SG B and SG D is required.

Diagnostic indication of steam line pressure is also required for PFSSD. Steam line pressure indication is used to determine if a steam generator ARV is stuck open, verification of heat removal per EMG ES-04, and verification of an actual SIS per EMG E-0. Section 5.2.2 discusses steam line pressure SIS initiation, whereas this section discusses availability of steam line pressure indication on the MCBs.

Cables associated with SG level transmitters AELT0501 (SG A WR), AELT0518 (SG A NR), AELT0551 (SG A NR), AELT0528 (SG B NR), AELT0529 (SG B NR), AELT0503 (SG C WR), AELT0538 (SG C NR), AELT0539 (SG C NR), AELT0548 (SG D NR) and AELT0554 (SG D NR) are run in area C-24. In addition, cables associated with level indicators associated with these level transmitters are run in this area. Damage to these cables due to a fire will prevent indication on the associated level indicators in the control room. Alternate level indication remains available on all four SGs using the following level indicators:

Steam Generator	Available Level Indication
A	AELI0517 (NR), AELI0519 (NR)
B	AELI0502 (WR), AELI0527 (NR), AELI0552 (NR)
C	AELI0537 (NR), AELI0553 (NR)
D	AELI0504 (WR), AELI0547 (NR), AELI0549 (NR)

As discussed in Section 5.2.2, cables associated with steam line pressure transmitters ABPT0514, ABPT0524, ABPT0526, ABPT0534, ABPT0536 and ABPT0544 are run in fire area C-21. In addition, cables associated with steam line pressure indicators on the MCB for these transmitters are run in this area. Consequently, steam line pressure indication in the MCR for these transmitters will not be available. Alternate steam line pressure indication remains available using the pressure indicators in the following table:

Steam Generator	Available Pressure Indication
A	ABPI0515A, ABPI0516A
B	ABPI0525A
C	ABPI0535A
D	ABPI0545A, ABPI0546A

Based on the above discussion, steam generator level indication and main steam line pressure indication is available on all four steam generators if a fire occurs in fire area C-21.

References: E-15000, XX-E-013, E-13AE08, E-13AE12, E-13SB08A, E-13SB08D, E-1F9203, M-12AE01, M-12AE02, M-761-00132, M-761-00133, M-761-00137

5.2.6 Steam Generator Main Feedwater Isolation Valves

PFSSD requires that either the main feedwater isolation valves (MFIVs) be closed or the main feedwater pumps be stopped to prevent overfilling the steam generators. Flow diversion from auxiliary feedwater (AFW) to the main feedwater system piping is prevented by check valves AEV0420, AEV0421, AEV0422 and AEV0423. Closure of the main feedwater isolation valves is not required to prevent AFW flow diversion.

Each MFIV is designed to utilize system fluid (feedwater) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main feedwater. This is done by actuating either all close hand switch AEHS0080 (separation group 1) or AEHS0081 (separation group 4) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MFIV	AEHS0080 (Sep Group 1)		AEHS0081 (Sep Group 4)	
	Solenoids	Cable	Solenoids	Cable
AEFV0039	MV1, MV3, MV5	11AEK16AH	MV2, MV4, MV6	14AEK17AH
AEFV0040	MV1, MV3, MV5	11AEK17AH	MV2, MV4, MV6	14AEK16AH
AEFV0041	MV1, MV3, MV5	11AEK16BH	MV2, MV4, MV6	14AEK17BH
AEFV0042	MV1, MV3, MV5	11AEK17BH	MV2, MV4, MV6	14AEK16BH

All 4 cables associated with the 12 separation group 1 solenoid valves are run in area C-21. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 4 cables associated with hand switch AEHS0081 are unaffected by a fire in area C-21. Therefore, hand switch AEHS0081 is available to close the four MFIVs.

Cable 11ABK30BB provides 125 VDC power to Train A main steam and feedwater isolation system (MSFIS) actuation cabinet SA075A from NK5119. Damage to this cable would disrupt power to the separation group 1 solenoids and close the MFIVs, which is the desired PFSSD position. In addition, the Train B MSFIS is unaffected by the fire and AEHS0081 is available to close the MFIVs.

Cable 11AEK14AB is a control cable associated with hand switch AEHS0080. An open circuit will prevent closing the MFIVs using this hand switch. A hot short will cause the valves to close, which is the desired PFSSD position. Hand switch AEHS0081 is unaffected by the fire.

Based on the above discussion, MFIV isolation is assured using hand switch AEHS0081.

References: E-15000, XX-E-013, E-13AB30, E-13AE14, E-13AE15, E-13AE16, E-13AE17, E-1F9201, J-104-00295, J-104-00296, M-12AE02

5.2.7 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire AFW demand to achieve cold shutdown and is available if a fire occurs in this area.

Motor operated valves (MOVs) in the system allow operators to line up the auxiliary feedwater system as required to achieve and maintain safe shutdown. Damage to the MOV circuits due to a fire could prevent operators from lining up the system from the control room.

Several PFSSD cables associated with various components of the auxiliary feedwater system (AL) run through fire area C-21. These cables are identified in Table C-21-3. All cables are associated with Train A (separation group 1). There are no Train B (separation group 4) cables associated with the AFW system running through fire area C-21.

Damage to the Train A cables listed in Table C-21-3 could prevent operation of Train A MDAFP. However, Train B MDAFP and the TDAFP are unaffected by a fire in area C-21. The suction source to the Train B MDAFP is available from the CST and Train B ESW. The suction source to the TDAFP is available from Train B ESW only. The TDAFP is available to supply AFW to steam generators B and C but the capability of the TDAFP to supply steam generators A and D could be affected.

Condensate storage tank pressure transmitters ALPT0037, ALPT0038 and ALPT0039 are included in the PFSSD design because they initiate swap over to ESW upon 2/3 low CST pressure indications. Panels SA036A, SA036B and SA036C monitor pressure transmitter signals on ALPT0037, ALPT0039 and ALPT0038, respectively. A spurious low CST pressure due to fire damage to cables associated with two of these pressure transmitters could swap the water source to ESW. This is only a commercial concern and should be prevented if possible.

Cables 11ALI08AA and 11ALI08AC are instrument cables associated with ALPT0037. Cables associated with the remaining two pressure transmitters are not run in C-21. Therefore, swap over to ESW due to spurious low CST pressure is not feasible if a fire occurs in this area.

Cable 11SAK21AA supplies 125 VDC power to panel SA036A. Cable 11SAY21AA supplies 120 VAC power to panel SA036A. Damage to these cables could result in a loss of power to the panel and could prevent automatic operation of Train A low suction pressure (LSP) swap over. Power cables associated with LSP signals controlled by panels SA036B and SA036C are unaffected by a fire in this area.

Based on the above discussion, auxiliary feedwater is assured if a fire occurs in fire area C-21 using Train B MDAFP supplying auxiliary feedwater to steam generators A and D and the TDAFP supplying AFW to steam generators B and C. However, as discussed in Section 5.2.1, steam generators A and C ARVs could be affected. Therefore, the assured method to achieve PFSSD if a fire occurs in this area is the Train B MDAFP supplying steam generator D and the TDAFP supplying steam generator B.

References: E-15000, XX-E-013, E-13AL01A, E-13AL01B, E-13AL02A, E-13AL02B, E-13AL03A, E-13AL03B, E-13AL04A, E-13AL04B, E-13AL05A, E-13AL05B, E-13AL07A, E-13AL08, E-13AL09, E-13SA21, E-1F9202, E-1F9203, E-1F9204, E-1F9402A, E-1F9402B, J-10SA, M-12AL01

5.2.8 Pressurizer PORVs and Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed. Cables and components associated with PORV BBPCV0455A and associated block valve BBHV8000A are run through area C-21. Cables and components associated with PORV BBPCV0456A and associated block valve BBHV8000B are not located in fire area C-21.

The pressurizer PORVs are not considered high/low pressure interfaces. The valves are supplied power by an ungrounded 125 VDC system. Therefore, based on GL 86-10, consideration of multiple proper polarity hot shorts is not required. A single proper polarity hot short still needs to be considered.

In the event a fire causes BBPCV0455A to open and damages BBHV8000A cables, Operators can close BBPCV0455A by placing hand switch BBHIS0455A, located on RL021, in the close position. Pressurizer level and RCS pressure indication are available to diagnose a failed open PORV using BBLI0460A and BBPI0406, respectively. In addition, pressurizer pressure indication is available using BBPI0456 and BBPI0458.

Instrument cables 11BBI16KB and 13BBI16MB associated with pressurizer pressure transmitters BBPT0455 and BBPT0457 are run in fire area C-21. Damage to these cables could send a spurious high-pressure signal to the pressurizer master controller. As discussed in Calculation XX-E-013, Appendix 1, the Ovation pressurizer pressure control system uses 4-channel verification from all four pressurizer pressure transmitters to operate the pressurizer PORVs. Failure of a single channel will not cause the spurious operation of the PORVs since the system uses the 2nd highest input as the validated signal. Damage to two channels will not cause the PORVs to open because both channels would have to fail to the exact same value at the exact same time and therefore this failure mode is not credible, as discussed in XX-E-013.

Cable 15SBS06AD provides output from panel RP043 to solid state protection cabinet SB029D to energize relay K713 on high pressure in the pressurizer. High pressurizer pressure will close the K713 contact (drawing E-13BB40) and open pressurizer PORV BBPCV0455A. Low pressure in the pressurizer will open the K750 contact (drawing E-13BB40) and close the PORV. Therefore, damage to this cable could cause the spurious opening of the PORV. If damage is limited to this cable, the PORV can be closed by placing BBHIS0455A in the close position.

The PFSSD function of cable 15SBS08ED is to provide BBPT0455 pressurizer pressure input signals from SB038 (Protection Set I) to Ovation NSSS control cabinet 6 (RP047). The PFSSD function of cable 15SBS08GC is to provide BBPT0457 pressurizer pressure input signals from SB037 (Protection Set III) to Ovation NSSS control cabinet 6 (RP047). These cables carry a 0 to 10 VDC signal to the Ovation pressure control system. The operation of the Ovation pressure control system is described above and in Calculation XX-E-013. Due to the 4-channel validation logic of the Ovation controller, damage to these cables will not cause the spurious operation of the pressurizer PORVs, spray valves or heaters. Therefore, damage to cables 15SBS08ED and 15SBS08GC will not adversely impact PFSSD.

Cables 15SCR15RF and 15SCR15RG are Ethernet cables that provide data communication between panels RP047 and RP043. These cables support functionality of pressurizer PORV BBPCV0455A. Damage to these data cables will not result in spurious operation of the valve.

Based on the above discussion, pressurizer PORV BBPCV0455A could spuriously open due to damage to the PORV control cables and block valve BBHV8000A may not close due to cable damage. The PORV can be closed using hand switch BBHIS0455A in the main control room.

References: E-15000, XX-E-013, E-13BB16, E-13BB39, E-13BB40, E-13SB06, E-13SB08C, E-13SC03, E-13SC07, E-1F9201, E-1F9301, M-12BB02, M-744-00028, M-761-02018, M-761-02079, M-761-02127, M-761-02169, M-761A-00019, M-767-00186, OFN KC-016, CR 13079, DCP 12944, DCP 13324.

5.2.9 Reactor Coolant System (RCS) Pressure Indication

The PFSSD design requires RCS pressure indication to be available to ensure operators have adequate diagnostic indication of RCS pressure.

RCS pressure indication is provided in the control room using pressure indicators BBPI0405 or BBPI0406. Cable 11BBI15EB is an instrument cable that runs from pressure transmitter BBPT0405 to process protection cabinet SB038. Cable 11SBS08AC is an instrument cable that runs from SB038 to BBPI0405 on RL021. Damage to these cables will prevent pressure indication on BBPI0405.

Redundant RCS pressure transmitter BBPT0406 and pressure indicator BBPI0406 are unaffected by a fire in area C-21. Therefore, RCS pressure indication is available using BBPI0406.

References: E-15000, XX-E-013, E-13BB15, E-13BB16, E-13SB08D, E-1F9201, E-1F9205, M-12BB04, M-761-00133

5.2.10 RCS Hot and Cold Leg Temperature Elements

PFSSD requires RCS hot and cold leg temperature indication on at least one loop to verify flow through the steam generators. The temperature elements used for this purpose are listed in the table below.

RCS Hot and Cold Leg Temperature Elements/Indicators Used for PFSSD		
ELEMENT	**INDICATOR**	**FUNCTION**
BBTE0413A	BBTI0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	BBTI0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	BBTR0423	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	BBTI0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	BBTR0433	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	BBTR0433	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	BBTR0443	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	BBTR0443	RCS Cold Leg Temperature Element (WR) Loop 4

As identified in Table C-21-3, cables associated with RCS temperature elements BBTE0413A, BBTE0423A, BBTE0433B and BBTE0443B and RCS temperature indicators BBTI0413A and BBTI0423A are run in fire area C-21. A fire could damage these cables and cause temperature indication on the four temperature elements to be unavailable. Consequently, temperature indication on at least one leg on each loop could be lost, which is not in accordance with the PFSSD methodology at Wolf Creek.

Cable 15RLY01EA supplies 120 VAC power from PN0738 to RL021/RL022. The power splits at RL021/RL022 and supplies power to PFSSD component BBTR0423 as well as some non-PFSSD components. Loss of power to this temperature recorder will not adversely impact PFSSD since other methods are available to determine RCS temperature, as described below.

Procedure EMG ES-04, Attachment B Section B1 provides alternate indication in the control room that may be used to verify natural circulation flow. One of these methods verifies that steam generator pressure is stable or decreasing. Based on Sections 5.2.1 and 5.2.7, cooldown is assured using loops 2 and 4. Based on Section 5.2.5, SG B pressure transmitter ABPT0525 and SG D pressure transmitters ABPT0545 and ABPT0546 are unaffected by a fire in C-21. These pressure transmitters, along with their respective indicators in the control room, can be used, per EMG ES-04, to verify heat removal in loops 2 and 4.

The configuration is acceptable because, in the event of a fire in area C-21, cooldown can be performed using RCS loops 2 and 4. RCS wide range hot and cold leg temperature elements (BBTE0423B and BBTE0443A) as well as ABPT0525, ABPT0545 and ABPT0546 will provide indication of flow through the steam generators.

References: E-15000, XX-E-013, E-13BB15, E-13RL01, E-13RL06, E-13SB08D, E-1F9201, M-12AB01, M-12BB01, M-761-00133, EMG ES-04

5.2.11 Pressurizer Pressure and Level Indication

The PFSSD support function requires pressurizer pressure and level indication to be available. These indications are used to diagnose spurious actuations such as a failed open pressurizer PORV and failed open letdown valves causing a loss of RCS inventory.

Pressurizer pressure is provided by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458. Signals from these transmitters are indicated in the control room on pressure indicators BBPI0455A, BBPI0456, BBPI0457 and BBPI0458, respectively. As discussed in Section 5.2.2, cables associated with BBPT0455 and BBPT0457 are run in fire area C-21. In addition, cable 15SBS08AA associated with BBPI0455A and cable 15SBS08CA associated with BBPI0457 are run in fire area C-21. Damage to these cables will prevent pressurizer pressure indication on these indicators. Cables associated with pressurizer pressure indicators BBPI0456 and BBPI0458 are unaffected by a fire in this area.

Pressurizer level is provided by level transmitters BBLT0459 and BBLT0460. Signals from these transmitters are indicated in the control room on level indicators BBLI0459A and BBLI0460A. Cable 11BBI16PB associated with BBLT0459 runs through area C-21. In addition, cable 11SBS08AA associated with BBLI0459A is run in area C-21. Damage to these cables could prevent pressurizer level indication on BBLI0459A. Cables associated with pressurizer level transmitter BBLT0460 and level indicator BBLI0460A are unaffected by a fire in area C-21.

Based on the above discussion, pressurizer pressure and level indication is available using BBPI0456, BBPI0458 and BBLI0460A if a fire occurs in this area.

References: E-15000, XX-E-013, E-13BB16, E-13SB08A, E-13SB08B, E-13SB08D, E-1F9301, J-200-00095, M-12BB02, M-761-00133, M-761-00137

5.2.12 Reactor Head Vent Valves

PFSSD requires that one of the two reactor vessel head vent valves on each flow path (2 flow paths total) be closed to prevent uncontrolled depressurization of the RCS. Either BBHV8001A or BBHV8002A and either BBHV8001B or BBHV8002B needs to be closed.

Cables associated with head vent valves BBHV8001A and BBHV8002A run through C-21. An external (+) 125 VDC hot short in these cables is the only failure that will spuriously open the valves. The cable associated with BBHV8001A runs in tray with other cables carrying the proper voltage and polarity, therefore BBHV8001A could spuriously open.

Cable 11BBK30CA, associated with BBHV8002A, runs in conduit throughout this area. Only one other cable (11BGK48CB) associated with excess letdown valve BGHV8153A runs in this conduit. A hot short between cables 11BBK30CA and 11BGK48CB will not cause BBHV8002A to open since 11BGK48CB does not have a normally energized proper polarity source conductor to cause the spurious operation. Hand switch BGHIS8153A is maintained in the close position (contacts open) which prevents energizing the source conductor.

Cables for the remaining two head vent valves are not run through area C-21. Therefore, the second flow path is isolated using either head vent valve BBHV8001B or BBHV8002B.

Based on the above discussion, the reactor head vent flow path will remain isolated throughout the event. Valve BBHV8002A will remain closed as long as BGHIS8153A is maintained in the close position and valves BBHV8001B and BBHV8002B are unaffected.

References: E-15000, XX-E-013, E-1F9301, E-13BB30, E-13BG48, M-12BB04

5.2.13 Centrifugal Charging System

At least one centrifugal charging pump (CCP) is required for PFSSD to provide RCP seal cooling, reactivity control and inventory control. These functions are accomplished using a CCP taking suction from the refueling water storage tank (RWST) and injecting through the RCP seals. RCP seal injection provides approximately 20 gpm makeup to the RCS and provides adequate boron concentration to maintain sub-critical reactivity conditions. If RCP seal injection is unavailable, reactivity and inventory control is provided by lining up the CCPs to the boron injection tank (BIT). The normal charging pump (NCP) is not credited and is assumed lost.

Cables 11BGB01AB and 11BGB01AE associated with breaker NB0104 control circuit for Train A charging pump motor DPBG05A run in this area. Damage to the cables could prevent operation of the Train A charging pump. Redundant Train B charging pump PBG05B is unaffected by a fire in this area.

Cables 11BGG11CC and 11BGG11CD associated with Train A CCP miniflow valve BGHV8110 run through area C-21. Redundant Train B cables for miniflow valve BGHV8111 are run in a different area and are unaffected by a fire in area C-21.

Cable 11BGG52AC, associated with Train A RCP seal injection flow throttling valve BGHV8357A, is run in fire area C-21. Damage to this cable will prevent operation of the valve from the control room. PFSSD requires RCP seal injection using an available centrifugal charging pump and flowing through the associated throttling valve. Cables associated with redundant Train B valve BGHV8357B are run in a separate fire area and are unaffected by a fire in area C-21.

Cable 11BGI51AA associated with RCP total seal flow transmitter BGFT0215A and cable 11SBS08AA associated with RCP total seal flow indicator BGFI0215A are run in this area. Damage to these cables could prevent operators from using BGFI0215A to diagnose a loss of RCP seal injection. Flow indicator BGFI0215B is unaffected by a fire in this area and can be used to inform operators if RCP seal injection has been lost.

Based on the above discussion, the Train A CCP could be affected but the Train B CCP is available if a fire occurs in area C-21. Loss of the operating charging pump can be diagnosed using BGFI0215B.

References: XX-E-013, E-15000, E-13BG01, E-13BG11B, E-13BG51, E-13BG52, E-13SB08D, E-1F9102, E-1F9302, E-1F9401A, M-12BG03

5.2.14 Charging Flow to Regenerative Heat Exchanger Isolation Valves

PFSSD requires charging flow to be directed to the RCP seals. To ensure adequate flow to RCP seals, flow diversion to the regenerative heat exchanger needs to be prevented. Valves BGHV8105 and BGHV8106 are included in the PFSSD design to accomplish this task. Manual valve BG8402B is also included to provide an alternate means of closing this flow path if either BGHV8105 or BGHV8106 are unavailable and is also used during alternate safe shutdown per OFN RP-017.

Cables associated with BGHV8106 are run in fire area C-21 and could be damaged by a fire, preventing valve BGHV8106 from being closed from the control room. Cables associated with redundant valve BGHV8105 do not run in fire area C-21. Consequently, valve BGHV8105 can be isolated from the control room if a fire occurs in fire area C-21.

References: E-15000, XX-E-013, E-13BG11A, E-1F9102, E-1F9302, M-12BG03

5.2.15 Volume Control Tank (VCT)

Power and control cables associated with VCT valve BGLCV0112B run through fire area C-21. Cables for redundant VCT valve BGLCV0112C are run in a separate fire area and are unaffected by a fire in area C-21. The PFSSD position of these valves is at least one closed. Therefore, PFSSD can be accomplished by isolation of BGLCV0112C.

A hot short could cause inadvertent closure of BGLCV0112B. If this occurs prior to establishing suction from the RWST, damage to the operating charging pump could occur due to loss of suction. The assumptions in calculation XX-E-013 state that systems and components are in their normal operating position or status prior to the fire. The Normal Charging Pump (NCP) is the normally operated pump and is assumed to be operating at the time of the fire. Inadvertent closure of valve BGLCV0112B with no suction from the RWST would result in damage to the NCP but the centrifugal charging pumps would remain unaffected. As stated in 5.2.13, the Train A CCP may be unavailable but the Train B CCP is unaffected by the fire.

As discussed in Section 5.2.2, a spurious SIS could occur as a result of a fire in this area, causing automatic start of the CCPs and swap over to the RWST. RWST to CCP B suction valve BNLCV0112E is unaffected by a fire in area C-21 and would open, as designed, upon receipt of a SIS. Therefore, if valve BGLCV0112B were to spuriously close coincident with a SIS, the suction source to CCP B would be available.

Cables 11BGI51CA and 11SBS08AA associated with VCT level transmitter BGLT0112 runs through area C-21. Damage to cable 11BGI51CA could cause a false low-low VCT level signal and initiate refueling water sequence, which is the desired PFSSD lineup. Damage to cables 11BGI51CA or 11SBS08AA could prevent VCT level indication on BGLI0112 in the control room. Cables associated with BGLT0185 are unaffected by the fire and BGLI0185 will provide reliable level indication in the control room.

Based on the above discussion, a fire in area C-21 that affects components associated with the VCT will not adversely impact the ability to achieve and maintain PFSSD.

References: XX-E-013, E-15000, E-13BG12, E-13BG12A, E-13BG51, E-13BN01, E-13SB08D, E-1F9102, E-1F9302, M-12BG03

5.2.16 Excess Letdown Isolation Valves

PFSSD requires the excess letdown path be isolated to prevent uncontrolled depressurization of the RCS. To accomplish this, either normally closed valve BGHV8153A or BGHV8154A must be maintained closed and either normally closed valve BGHV8153B or BGHV8154B must be maintained closed. Cables associated with valves BGHV8153A and BGHV8154A are run in fire area C-21.

Cable 11BGK48DB is run in cable tray through area C-21. A hot short in this cable will energize the solenoid and open valve BGHV8154A. The cable tray carries other cables that have the proper voltage and polarity such that a cable-to-cable hot short is possible. Therefore, valve BGHV8154A could spuriously open if a fire occurs in fire area C-21.

Cable 11BGK48CB is run in conduit through area C-21. This conduit carries one other cable (11BBK30CA) which is a control cable for head vent valve BBHV8002A and is normally de-energized. Therefore, the possibility of an inter-cable hot short that would cause valve BGHV8153A to open is not credible.

A hot short in cable 11BGK48CB is not sufficient to cause the valve to open because this failure mode would not energize the control solenoid.

Circuits for BGHV8153B and BGHV8154B do not run through fire area C-21 and are unaffected by a fire in this area. Therefore, these valves remain closed.

Based on this discussion, there is reasonable assurance that cable damage, along with any combination of cable failures, will not cause valve BGHV8153A to spuriously open in the event of a fire in area C-21. Therefore, both excess letdown flow paths will remain isolated.

References: E-15000, XX-E-013, E-1F9301, E-13BG48, M-12BG01

5.2.17 Refueling Water Storage Tank (RWST) to Charging Pumps Suction Isolation Valves

Cables associated with RWST to CCP A valve BNLCV0112D run through fire area C-21. As stated earlier, the Train A CCP may not be available if a fire occurs in fire area C-21. Therefore, the Train B CCP is used, taking suction from the RWST. Cables associated with valve BNLCV0112E are unaffected by a fire in area C-21. Therefore, BNLCV0112E can be opened from the control room to provide the necessary suction from the RWST to Train B CCP.

References: E-15000, XX-E-013, E-13BN01, E-1F9102, E-1F9302, M-12BN01

5.2.18 Refueling Water Storage Tank (RWST) and Containment Sump Isolation Valves

To prevent drain down of the RWST into the containment sump, PFSSD requires that either valve BNHV8812A or valve EJHV8811A and valve BNHV8812B or valve EJHV8811B be closed during hot standby. For cold shutdown, the operating train containment sump valve (EJHV8811A or EJHV8811B) must be maintained closed to prevent flow diversion from the RCS to the containment sump. Valves BNHV8812A and BNHV8812B are normally open and valves EJHV8811A and EJHV8811B are normally closed.

A control cable (11BNG03AC) for valve BNHV8812A runs through fire area C-21. Damage to this cable could prevent closing this valve from the control room or could cause the valve to spuriously close. In addition, cable damage could prevent the valve from automatically closing when valve EJHV8811A reaches full open position.

A control cable (11EJG06AC) associated with valve EJHV8811A runs through fire area C-21. Damage to this cable will not result in valve EJHV8811A opening as long as valve BNHV8812A remains open. If valve BNHV8812A is fully closed, it will provide a permissive for valve EJHV8811A to open. If valve EJHV8811A opens due to damage to cable 11EJG06AC, drain down will not occur since valve BNHV8812A is closed.

The instrument cable for RWST level transmitter BNLT0930 and level indicators BNLI0930 and BNLI0932 run through area C-21. Cables for the remaining three RWST level transmitters and two level indicators are unaffected. Damage to the cables associated with BNLI0930 and BNLI0932 will not cause a spurious low RWST level. Since only one RWST level transmitter cable is run in this area, a spurious low RWST level signal is not credible.

Based on the above discussion, drain down of the RWST to the containment sump is not credible if a fire occurs in area C-21.

References: E-15000, XX-E-013, E-1F9205, E-13BN03, E-13BN03A, E-13BN07, E-13EJ06A, E-13EJ06B, E-1F9102, M-12BN01, M-12EJ01, M-10BN, M-761-02008, M-761-02069, CR 25002

5.2.19 Essential Service Water System

One train of Essential Service Water (ESW) is required to be operable to ensure adequate cooling for essential equipment. A number of cables associated with Train A ESW components are run in this area. Therefore, Train A ESW cannot be relied on for PFSSD if a fire occurs in this area. Cables associated with Train B ESW are run in a different fire area. Therefore, Train B ESW is available if a fire occurs in fire area C-21.

Valve EFHV0023 is a normally open isolation valve on the service water system feed to the Train A Essential Service Water System. Either this valve or valve EFHV0025 is required to be closed when operating the Train A ESW system for PFSSD. Power and control cables associated with EFHV0023 are run in this area. Damage to these cables could prevent closing EFHV0023 from the control room. Redundant valve EFHV0025 is unaffected by a fire in area C-21 and can be closed from the control room to isolate this flowpath. In addition, check valve EFV0470 is installed in this line and will prevent flow diversion in the unlikely event valve EFHV0025 cannot be closed.

Valve EFHV0024 is a normally open isolation valve on the service water system feed to the Train B Essential Service Water System. Either this valve or valve EFHV0026 is required to be closed when operating the Train B ESW system for PFSSD. Power and control cables associated with EFHV0024 are run in this area. Damage to these cables could prevent closing EFHV0024 from the control room. Redundant valve EFHV0026 is unaffected by a fire in area C-21 and can be closed from the control room to isolate this flowpath. In addition, check valve EFV0471 is installed in this line and will prevent flow diversion in the unlikely event valve EFHV0026 cannot be closed.

Valve EFHV0041 is a normally open isolation valve on the return line from the Train A Essential Service Water System to the service water system. Either this valve or valve EFHV0039 is required to be closed when operating the Train A ESW system for PFSSD. Power and control cables associated with EFHV0041 are run in this area. Damage to these cables could prevent closing EFHV0041 from the control room. Redundant valve EFHV0039 is unaffected by a fire in area C-21 and can be closed from the control room to isolate this flowpath.

Valve EFHV0042 is a normally open isolation valve on the return line from the Train B Essential Service Water System to the service water system. Either this valve or valve EFHV0040 is required to be closed when operating the Train B ESW system for PFSSD. Power and control cables associated with EFHV0042 are run in this area. Damage to these cables could prevent closing EFHV0042 from the control room. Redundant valve EFHV0040 is unaffected by a fire in area C-21 and can be closed from the control room to isolate this flowpath.

Valve EFHV0037 is the Train A return isolation valve from ESW to the Ultimate Heat Sink. This valve is required to be open when operating the Train A ESW system for PFSSD. A cable (11EFG06AC) associated with this valve is run in this area and damage could cause the valve to spuriously close. Circuits for redundant Train B valve EFHV0038 are not run in area C-21 and will be unaffected by the fire.

Cable 11GDI04AA provides ESW A room temperature from temperature element GDTE0001 to temperature controller GDTC0001. Cables 11GDI04AB and 11GDI04AC provide signals from GDTC0001 to outside air intake damper GDTZ0001A and recirculation damper GDTZ0001B, respectively, to change position based on room temperature. Damage to these cables could prevent operation of the dampers. Temperature controls for Train B ESW pump room are unaffected by a fire in area C-21.

Cable 11GDG01AC is associated with the indicator lights on Train A ESW pump room supply fan CGD01A hand switch GDHIS0001B. Damage to this cable could prevent operation of the fan. Cables for Train B ESW pump room supply fan CGD01B are unaffected by a fire in this area.

Cable 11RPY10BA supplies 120 VAC control power to the automatic and manual start circuits in panel RP068 from NG01ACR1 for Train A ESW pump room supply fan CGD01A. Cables 11GDY01AA, 11GDY01AB and 11GDY01AC are associated with the Train A ESW pump room supply fan CGD01A control circuit. Damage to these cables could prevent operation of the unit, which could prevent continuous operation of the Train A ESW pump. If this occurs, the Train B ESW pump room supply fan is unaffected by the fire.

PFSSD is assured for a fire in area C-21 using Train B ESW pump PEF01B and associated components.

References: E-15000, XX-E-013, E-093-00052, E-093-00053, E-13EF02, E-13EF03, E-13EF04, E-13EF05, E-13EF06, E-13EF07, E-13EF08, E-13EF09, E-13RP10, E-13EF11, E-K3EF08, E-K3GD01, E-K3GD04, E-1F9402A, E-1F9402B, E-1F9403, E-1F9424A, E-1F9443, E-K3EF01, J-201-00139, M-12EF01, M-12EF02, M-K2EF01, M-K2GD01

5.2.20 Component Cooling Water

For PFSSD, the component cooling water (CCW) system is used to provide cooling to the centrifugal charging pump (CCP) oil cooler, the RHR heat exchanger and the RHR pump seal cooler. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling. Cables associated with Train A CCW pumps PEG01A and PEG01C are run in this area. Damage to these cables could prevent operation of the Train A CCW system.

Cables associated with a number of valves in the Train A CCW system are run in fire area C-21. These cables and associated valves are listed in Table C-21-3. Cables associated with valves in the Train B CCW system do not run in fire area C-21 and are unaffected by a fire in this area.

Valves BBHV0013, BBHV0014, BBHV0015, BBHV0016, EGHV0058, EGHV0061, EGHV0126 and EGHV0132 provide isolation capability for CCW flow to/from the RCP thermal barriers. Cables associated with these components are located in area C-21. If the valves fail to the open position, CCW would continue to flow to the RCP components, including the thermal barrier. This continued flow of water will not adversely impact PFSSD. If the valves fail to the closed position, CCW flow to the thermal barrier could be lost. This is acceptable since RCP seal injection is available.

Flow transmitters BBFT0017, BBFT0018, BBFT0019 and BBFT0020 are associated with valves BBHV0013, BBHV0014, BBHV0015 and BBHV0016, respectively. The flow transmitters monitor flow in the CCW piping and shut the valves on high CCW flow. Cables associated with these flow transmitters are run in this area. Damage to these cables could cause a spurious high CCW flow signal and close the valves. Damage to the valve cables could prevent re-opening the valves.

Cable 11EGI19AA is associated with CCW to RCP flow indicator EGFI0128. Cable 11EGI19AB is associated with CCW to RCP flow transmitter EGFT0128. Damage to these cables could prevent operators from diagnosing a loss of CCW flow to the RCP thermal barriers using flow indicator EGFI0128. CCW to RCP flow indicator EGFI0129 is unaffected by a fire in area C-21 and can be used to diagnose a loss of CCW flow to the RCP thermal barriers.

Based on the above discussion, a fire in area C-21 could affect CCW flow to/from the RCP thermal barriers. The Train B CCW system is available to supply cooling to the remaining Train B PFSSD components. Loss of CCW flow to the RCP thermal barriers can be diagnosed using flow indicator EGFI0129. RCP seal injection is unaffected.

References: E-15000, XX-E-013, E-13BB03, E-13BB28, E-13EG01A, E-13EG01B, E-13EG05A, E-13EG05B, E-13EG07, E-13EG09, E-13EG09A, E-13EG13, E-13EG16, E-13EG17A, E-13EG18, E-13EG19, E-1F9303, E-1F9401A, M-12EG01, M-12EG02, M-12EG03

5.2.21 Residual Heat Removal System

PFSSD requires one train of residual heat removal (RHR) to be available for shutdown cooling. The RHR system is not used for hot standby.

A number of cables associated with the RHR system run in fire area C-21. These cables are discussed in the following paragraphs. The PFSSD impact on the RHR system due to a spurious SIS is discussed in Section 5.2.2. This Section discusses fire damage to RHR system cables and components absent a spurious SIS.

Valve EGHV0101 is the Train A CCW to RHR Heat Exchanger control valve. Valve EGHV0102 is the Train B CCW to RHR Heat Exchanger control valve. PFSSD requires that the valve on the operating train of CCW be closed until shutdown cooling mode is entered, at which time the valve on the operating train of RHR needs to be open. Cables 11EGG07AC and 11EGG07AD are control cables associated with valve EGHV0101. Damage to either cable could cause the spurious opening of the valve and could prevent operation when lining up for shutdown cooling. Valve EGHV0102 is unaffected by a fire in this area.

Cables 11EJB01AB and 11EJB01AC are control cables associated with Train A RHR pump feeder breaker NB00101. Damage to these cables could prevent operation of the pump from the control room or could cause the pump to spuriously operate. If the pump fails to operate, the Train B RHR pump is available. If the pump spuriously operates with no suction source, it will likely become damaged and the Train B RHR system will be used.

Cable 11EJG04AC is a control cable associated with normally closed valve EJHV8804A. This valve is required to remain closed when aligning Train A RHR for cold shutdown. For hot standby, the valve can be in any position. Damage to this cable could cause the valve to open which would cause flow diversion from Train A RHR to the charging header. Train B valve EJHV8804B is unaffected by a fire in area C-21.

Cables associated with normally closed valves EJHV8701A (Train A) and EJHV8701B (Train B) run in fire area C-21. These valves are required to be open when aligning the respective RHR Train for cold shutdown. Cable damage could prevent opening the associated valve from the control room. Therefore, a fire in area C-21 may require a cold shutdown repair to be made within 72 hours per 10CFR50, Appendix R or a containment entry to manually open EJHV8701B when using RHR Train B.

Cable 11EJG08AC, associated with Train A RHR pump mini-flow valve EJFCV0610, runs in fire area C-21. The mini-flow valve protects the Train A RHR pump during low-flow in the system. Damage to the cable could prevent operation of the valve. Cables associated with Train B RHR mini-flow valve EJFCV0611 do not run in fire area C-21. Therefore, the Train B RHR pump mini-flow valve is unaffected by a fire in area C-21.

The RHR pump discharge to RCS cold leg isolation valve (EJHV8809A or EJHV8809B) needs to be open on the operating train. Damage to cables 11EJG09CC and 11EJG09CD would

likely result in valve EJHV8809A remaining in its as-is normally open position, which is the preferred PFSSD position. However, two proper intra-cable hot shorts in cable 11EJG09CD or one intra-cable hot short in cable 11EJG09CD combined with a short to ground on conductor 31 would spuriously close the valve.

Cable 15EJI12AA is an instrument AC power cable associated with Train A RHR flow control valve EJHCV0606. Cable 15RLY01DA supplies 120 VAC power to RL017/RL018 from PN0736, where the power splits and feeds EJHCV0606 via cable 15EJI12AA. Damage to these cables would cause a loss of power to the valve controller which will fail the valve open, which is the desired position if using Train A RHR. The Train B RHR flow control valve EJHCV0607 is unaffected by a fire in this area.

Based on the above discussion, a number of Train A RHR components could be affected by a fire in area C-21 but Train B RHR is unaffected. A cold shutdown repair or containment entry may be required to open valve EJHV8701B when going to cold shutdown.

References: E-15000, XX-E-013, E-13EJ01, E-13EJ04A, E-13EJ04B, E-13EJ05A, E-13EJ05B, E-13EJ08, E-13EJ09A, E-13EJ12, E-13RL01, E-13RL04, E-1F9205, E-1F9301, E-1F9401A, M-12EJ01, CR 25002

5.2.22 Safety Injection Pumps

The PFSSD strategy is to prevent operation of the Safety Injection (SI) pumps to ensure an adequate supply of borated water in the RWST. One cable (11EMB01AB) associated with Train A SI pump is run in fire area C-21. Damage to this cable could cause the spurious start of the pump and could prevent stopping the pump from the control room.

If the Train A SI pump spuriously starts with the reactor at normal pressure, PFSSD will be assured. The pump will not discharge into the RCS due to the pressure differential between the RCS (approximately 2,235 psig) and the SI pump shutoff pressure (approximately 1,565 psig). In addition, the set point of the discharge relief valve (EM8853A) to the Recycle Holdup Tank is 1,825 psig. Therefore, no inventory will be lost from the RWST if the SI pumps spuriously start. With the SI pump operating at zero flow, damage to the pump could occur, which is a commercial concern only since the SI pump is not credited in the PFSSD analysis. If necessary, the pump can be stopped by opening breaker NB0103, but this action is not required for PFSSD.

Based on the above discussion, spurious operation of the Train A SI pump will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13EM01, E-1F9102, E-1F9302, M-12EM01, M-721-00096, WCRE-01

5.2.23 Boron Injection Tank Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

A fire in area C-21 uses CCP B, since circuits and support systems for CCP A may be affected by the fire. Also, based on the discussion in 5.2.37, a fire in area C-21 has the possibility to cause a momentary loss of inventory through the letdown flow path until the letdown isolation valves close automatically or are failed closed.

Train A BIT inlet valve EMHV8803A may be affected by a fire in this area. Cables 11EMG02AC and 11EMG02AD, associated with EMHV8803A, are run in this area. Damage to these cables could prevent opening the valve and could prevent a flowpath from Train A CCP to the RCS via the BIT. Redundant Train B valve EMHV8801B is unaffected by a fire in this area so the Train B CCP flowpath to the RCS via the BIT is available.

The SIS test line is required to be isolated when charging through the BIT to prevent inventory loss. Either valve EMHV8964 or EMHV8871 is required to remain closed to prevent flow diversion through the SIS test line. Alternatively, both valves EMHV8843 and EMHV8882 can be closed to prevent flow. Cables associated with EMHV8964 and EMHV8882 are run in this area and the valves could open if damaged by a fire. Redundant valve EMHV8871 is unaffected by the fire and is available to ensure the SIS test line remains isolated.

Breaker PK6116 supplies power to a number of 125VDC loads on RL017/RL018 via cable 15RLK01DA. The only PFSSD load supplied by PK6116 is the control solenoid for valve EMHV8882. Valve EMHV8882 is the boron injection downstream test line and is required to be closed for PFSSD. De-energizing the control solenoid closes EMHV8882. Therefore, loss of power to the solenoid due to damage to cable 15RLK01DA will not impact PFSSD.

Based on the above discussion, charging through the BIT is unaffected by a fire in this area using Train B CCP and valves EMHV8801B and EMHV8803B. The SI test line can be isolated using valve EMHV8871.

References: E-15000, XX-E-013, E-13EM02, E-13EM02A, E-13EM02B, E-13EM02C, E-13EM05A, E-13EM12, E-13RL01, E-1F9302, M-12EM01, M-12EM02

5.2.24 Containment Spray Pumps

Spurious start of the containment spray (CS) pumps may complicate PFSSD due to the possible depletion of inventory in the RWST. Therefore, a spurious start of the CS pumps should be avoided or mitigated. A control cable (11ENB01AB) associated with Train A CS pump PEN01A runs through area C-21 and could cause a spurious start of the pump. The cable damage could prevent stopping the pump from the control room.

Normally closed valve ENHV0006 could open due to a spurious containment spray actuation signal. Also, a control cable associated with this valve runs in fire area C-21 and a hot short could cause the valve to open. If this occurs, water would flow from the containment spray nozzles, depleting inventory in the RWST.

Train B CS pump PEN01B could also start due to a spurious CSAS and valve ENHV0012 could open, causing containment spray on the Train B system. Cables associated with PEN01B are not run in this area so the pump can be stopped by placing main control room hand switch ENHIS0009 in pull-to-lock.

The total flow in the containment spray system with both pumps operating is 6,330 gpm (M-10EN). As stated above, the Train B pump can be stopped from the control room, after which the flow from containment spray will be 3,165 gpm. Based on calculation XX-E-013, Appendix 1, a maximum of 214,260 gallons of water can be lost from the RWST to maintain sufficient volume to achieve cold shutdown.

As stated previously, level indication in the RWST is available, so operators have the ability to diagnose a reducing RWST inventory. Assuming the Train B CS pump is stopped from the control room within 5 minutes, the time available to mitigate containment spray is:

6,330 gpm x 5 minutes = 31,650 gallons lost in first 5 minutes

214,260 gallons – 31,650 gallons = 182,610 gallons remaining after 5 minutes

182,610 gallons / 3,165 gpm = 57.7 minutes

57.7 min + 5 minutes = **62.7 minutes available**

A fire in this area could also result in the inability to isolate letdown, as discussed in Section 5.2.37. The maximum inventory loss through letdown is 195 gpm through all three orifice valves. If a multiple spurious operation scenario exists where containment spray spuriously operates concurrent with failed open letdown valves, the available time to mitigate this condition is as follows:

6,330 gpm + 195 gpm = 6,525 gpm lost for the first 5 minutes

6,525 gpm x 5 min = 32,625 gallons lost in first 5 minutes

214,260 gallons – 32,625 gallons = 181,635 gallons remaining after 5 minutes

Letdown is isolated in 50 minutes, at which time the 195 gpm flow goes to zero. The volume reduction from the RWST 45 minutes after the first containment spray pump is stopped is:

(3,165 gpm + 195 gpm) x 45 minutes = 151,200 gallons lost

181,635 gallons – 151,200 gallons = 30,435 gallons remaining after 50 minutes

30,435 gallons / 3,165 gpm = 9.6 minutes

50.0 min + 9.6 minutes = **59.6 minutes available**

Based on the above discussion, there is 59.6 minutes available to mitigate containment spray and failed open letdown, assuming one containment spray pump is stopped from the control room within 5 minutes and letdown is isolated within 50 minutes. Pump PEN01B can be stopped from the control room using ENHIS0009. Pump PEN01A can be stopped by opening breaker NB0102 in fire area C-9. This is an OMA. Refer to E-1F9900 for details. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 16.

References: XX-E-013, E-15000, E-13EN01, E-13EN03, E-1F9102, E-1F9302, E-1F9424A, E-1F9433, M-10EN, M-12EN01

5.2.25 Safety Injection Accumulator Isolation Valves

PFSSD requires isolation of the SI accumulators prior to reducing RCS pressure below the injection pressure to avoid unnecessary accumulator discharge. This is accomplished by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. These valves are normally open with the MCC breaker administratively locked in the open position. Cables for valves EPHV8808A and EPHV8808C are run in fire area C-21.

Since the breakers for these valves are normally open, damage to these cables will not cause the valves to spuriously change position. However, damage to the cables will prevent closing the associated valve from the control room after power is restored.

The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig. If necessary, a containment entry can be made to manually close the valves.

References: E-15000, XX-E-013, M-12EP01, E-13EP02A, E-1F9201, CKL EP-120

5.2.26 Control Room Air Conditioning

Cables associated with Train A control room A/C unit SGK04A are run in this area. Damage to these cables could prevent operation of this unit. Cables associated with Train B control room A/C unit SGK04B are run in a separate area. Therefore, the Train B control room A/C unit is unaffected by a fire in this area.

Power and control cables associated with Train A Control Room A/C unit supply and return dampers GKHZ0029A and GKHZ0029B are run in area C-21. Damage to these cables could prevent operation of the associated dampers. Circuits for Train B Control Room A/C unit dampers do not run in area C-21.

Based on the above discussion, Control Room environmental conditions will be unaffected by a fire in area C-21.

References: XX-E-013, E-15000, E-13GK02A, E-13GK02B, E-13SA19, E-1F9442, M-12GK01

5.2.27 Class 1E Electrical Equipment Room A/C Unit

Power and control cables associated with Train A class 1E Electrical Equipment room A/C unit SGK05A are run in fire area C-21. A fire could damage these circuits and prevent operation of the unit. Circuits for Train B class 1E Electrical Equipment A/C unit SGK05B do not run in fire area C-21. Therefore, the Train B class 1E Electrical Equipment A/C unit is unaffected by a fire in this area.

Cable 11SAZ19KA associated with SGK05A is run in fire area C-21. Damage to this cable could prevent operation of SGK05A. Cables associated with SGK05B are unaffected by a fire in area C-21.

Cable 15GKK31CB is associated with the fire isolation signal on SGK05A. Damage to this cable could cause the unit to stop and prevent a re-start. Fire isolation signal cables associated with Train B class 1E A/C unit SGK05B are unaffected.

Based on the above discussion, Train B class 1E electrical equipment room cooling is available and is unaffected by a fire in area C-21.

References: XX-E-013, E-15000, E-13GK13, E-13GK31, E-13SA19, E-1F9444, M-12GK03, M-622.1A-00002

5.2.28 Standby Diesel Generation

Cables associated with the Train A diesel generator are run in this area. Also, cables associated with the Train A diesel generator room supply fan and exhaust damper run in this area. Damage to these cables could prevent operation of the Train A diesel generator and support systems.

Calculation XX-E-013 documents a loss of off-site power evaluation that identifies the fire areas in and around the plant in which a fire could cause a loss of off-site and on-site power. Per XX-E-013 and Section 5.2.30 of this evaluation, a fire in area C-21 could cause a loss of

off-site power on Train A. Train B off-site power and Train B diesel generator are unaffected by a fire in this area. Therefore, loss of the Train A diesel generator and off-site power to Train A will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-13GM01, E-13GM04, E-13JE01, E-13KJ01A, E-13KJ06, E-13NE01, E-13NE10, E-1F9411A, E-1F9412A, E-1F9423, M-12GM01

5.2.29 Containment Coolers

PFSSD requires containment cooling to maintain the containment environment within EQ limits. Cables associated with Train A containment coolers are run in fire area C-21. Damage to these cables could prevent operation of the Train A containment coolers if a fire occurs in this area. Circuits for the Train B containment coolers are run in a separate fire area and are unaffected by a fire in area C-21.

As discussed earlier, Train B ESW is available if a fire occurs in fire area C-21. Therefore, the Train B containment coolers will have the necessary service water flow to ensure proper operation.

References: E-15000, XX-E-013, E-13GN02, E-13GN02A, E-1F9441, M-12GN01

5.2.30 Class 1E 4.16 kV ESF Switchgear Bus

Several cables associated with class 1E 4.16 kV switchgear bus NB01 are located in this area. Damage to these cables could prevent operation of Train A equipment powered by NB01. Cables associated with class 1E 4.16 kV switchgear bus NB02 are located in a different fire area and are unaffected by a fire in area C-21.

Cable 15RLK01CA supplies 125 VDC power to panel RL013/RL014 from PK6115. The PFSSD function of RL013/RL014 is to allow isolation of off-site power to NB01 and NB02 in the event of a fire in areas C-9 and C-10, respectively. RL013/RL014 is not required for PFSSD if a fire occurs in fire area C-21. Therefore, damage to this cable will not adversely impact the ability to achieve and maintain PFSSD in the event of a fire in area C-21.

Cable 15RPK09RA supplies 125 VDC power to panel RP060 from PK5113. The PFSSD function of RP060 is to isolate off-site power to NB01 and NB02 in the event of a fire in areas C-9 and C-10, respectively. RP060 is not required for PFSSD if a fire occurs in fire area C-21. Therefore, damage to this cable will not adversely impact the ability to achieve and maintain PFSSD in the event of a fire in area C-21.

Cable 15SY134 is associated with 13.8 kV off-site feeder breaker 13-48. Breaker 13-48 is one of two redundant off-site power feeders to bus NB01. Cable 15UU003 is associated with 13.8 kV off-site feeder breaker 13-8. Breaker 13-8 is the other redundant off-site power feeder for NB01. Damage to these cables could isolate the off-site power feed to NB01. Train B class 1E 4.16 kV bus NB02 is unaffected by a fire in area C-21. Therefore, damage to these cables will have no adverse impact on PFSSD.

Based on the above discussion, loss of power to NB01 and associated loads will not adversely impact PFSSD due to the availability of NB02 to supply redundant Train B PFSSD equipment.

References: XX-E-013, E-15000, E-13NB01, E-13NB02, E-13NB03, E-13NB10, E-13NB12, E-13NB13, E-13NG01A, E-13RL01, E-13RP09, E-1F9423, E-1F9425, E-1F9426, E-1000-SY12, E-1000-UU00, E-1005-SY01, E-1005-SY07

5.2.31 Train A 480 VAC Load Centers

Cables associated with 480 VAC load centers NG01, NG03 and motor control center (MCC) NG05E are run in area C-21. Damage to these cables could de-energize the load centers and MCCs, preventing operation of the associated Train A equipment.

Cables 11PKK10AA and 11PKK10AB are associated with the 125 VDC control circuit for NG0102, which supplies 480 VAC power to battery charger PK021. Damage to these cables could prevent closing NG0102 and supplying power to PK021. Battery charger PK022 is unaffected by a fire in this area.

Train B 480 VAC load centers NG02, NG04 and MCC NG06E are unaffected by a fire in this area and are available to supply power to redundant Train B equipment. Therefore, a fire in area C-21 will not impact the ability to supply power to required Train B 480 VAC equipment.

References: XX-E-013, E-15000, E-13NG10, E-13NG11, E-13PK10, E-1F9423, E-1F9424A, E-1F9424B, E-1F9424C, E-1F9424D, E-K3NG10

5.2.32 Class 1E 125 VDC Power to Main Control Boards

Several cables that supply class 1E 125 VDC power to the main control boards are run in fire area C-21. The cables run from the power supply to the control panel where the power is split to supply specific loads. The cables, power supply, control panel and affected PFSSD components are summarized in the following table.

CABLE	POWER SUPPLY	CONTROL PANEL	PFSSD EQUIPMENT	POSITION ON LOSS OF POWER	REQUIRED PFSSD POSITION
11RLK01AA	NK4119	RL001/002	BGHV8153A BGHV8154A	Closed Closed	Closed Closed
11RLK01CA	NK4112	RL017/018	EMHV8964	Closed	Closed
11RLK01DA	NK4113	RL019/020	EGTV0029 GMHZ0009	Closed Open	Closed Open
11RLK01EA	NK5109	RL021/022	BBHV8001A BBHV8002A	Closed Closed	Closed Closed

Based on the above table, the PFSSD equipment fails to the desired position upon loss of power. Therefore, damage to the cables will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13BB30, E-13BG48, E-13EG16, E-13EM12, E-13GM04, E-13RL01, E-13RL02, E-13RL03, E-13RL04, E-13RL05, E-13RL06, E-1F9301, E-1F9302, E-1F9401A, E-1F9422A, E-1F9444, M-12BB04, M-12BG01, M-12EG02, M-12EM01, M-12GM01

5.2.33 BOP Instrument Racks

BOP instrument racks RP053A, RP053B, RP053D and RP147 are credited in the PFSSD analysis. The following table identifies the PFSSD components served by each instrument rack.

Instrument Rack	PFSSD Components
RP053A (RP053AA, RP053AB, RP053AC)	ALHV0009, ALHV0011 ALPY0037A, EGFT0128, EGPSL0077, GDTSL0001, JELSL0001C
RP053B (RP053BA, RP053BB, RP053BC)	ALHV0007, ALPY0039A, EGFT0129, EGPSL0078, GDTSL0011, JELSL0021C
RP053D (RP053DA, RP053DB)	ALPY0038A
RP147 (RP147A, RP147B)	ALHV0005

Cables 11RPY09CA and 11RPY09DA supply 120 VAC power to Train A BOP instrument rack RP053A. Damage to these cables could cause a loss of function of panel RP053A and associated PFSSD components.

Cable 13RPY09AA supplies 120 VAC power to Train A BOP instrument rack RP053DB. Damage to this cable could cause a loss of function of panel RP053D and ALPY0038A.

Pressure converters ALPY0037A and ALPY0038A are associated with ESFAS low auxiliary feedwater suction pressure. Loss of these devices due to a fire could prevent an automatic swap over from the CST to the ESW system. The CST contains sufficient volume for PFSSD, and pressure indication is available in the control room using ALPT0039. Therefore, loss of these pressure converters will not adversely impact PFSSD.

Instrument racks RP053B and RP147B are unaffected by the fire. Therefore, loss of PFSSD components associated with RP053A and RP053D will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13AL08, E-13AL09, E-13EG13, E-13JE01, E-13NN01, E-13RP09, E-1F9101, E-1F9202, E-1F9204, E-1F9401B, E-1F9411A, E-1F9411B, E-1F9424D, E-1F9443, E-K3GD04, M-12AL01, M-12EG01, M-12JE01, M-K2GD01, E-K3GD01A

5.2.34 Reactor Protection System

The Reactor Protection System (RPS) monitors specified input parameters and initiates reactor protection features whenever those parameters are outside specified limits. Field installed transmitters continuously monitor various parameters and report the results to one of four process cabinets, one per channel. Signals are then sent from the process cabinets to both solid state protection cabinets, one on each train. The cabinets and associated channel are listed in the following table.

Process Cabinets	Solid State Protection Cabinets
Cabinet SB038 - Channel 1 Cabinet SB042 - Channel 2 Cabinet SB037 - Channel 3 Cabinet SB041 - Channel 4	Cabinet SB029A - Train A Input Cabinet Cabinet SB029B - Train A Logic Cabinet Cabinet SB029C - Train A Output Cabinet 1 Cabinet SB029D - Train A Output Cabinet 2

Process Cabinets	Solid State Protection Cabinets
	Cabinet SB032A - Train B Input Cabinet Cabinet SB032B - Train B Logic Cabinet Cabinet SB032C - Train B Output Cabinet 1 Cabinet SB032D - Train B Output Cabinet 2

The RPS is actuated upon 2/3 or 2/4 coincident logic, depending on the input parameter. This ensures that a loss of a single channel will not prevent the system from performing its function.

A number of cables associated with reactor protection system channels 1 and 3 run through this area. Some of these cables supply power from separation group 1 and 3 power supplies to the various panels. Other cables provide channel 1 and 3 signals from process cabinets SB037 and SB038 to solid state protection cabinets SB029A and SB032A. Cables associated with field installed transmitters associated with the RPS are discussed in other sections.

Cables 11SBS12AA and 11SBS12AC are associated with separation group 1 reactor trip circuits. Damage to these cables due to hot shorts could cause a spurious plant trip. Open circuits could prevent a manual trip on Train A but the Train B reactor trip circuits are unaffected by the fire.

Damage to cables associated with the RPS that run in this area could cause a loss of RPS channels 1 and 3, but channels 2 and 4 remain available. Spurious RPS actuation due to cable damage will not adversely impact PFSSD. These spurious actuations can either be mitigated as discussed in other sections (i.e., spurious SIS and CSAS), or the spurious actuation places the plant in a safe condition as designed. Therefore, damage to these cables will not adversely impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11NK01, E-11NK02, E-13NN01, E-13SB01, E-13SB02, E-13SB05, E-13SB08A, E-13SB08D, E-13SB09, E-13SB10, E-13SB12A, E-1F9101, E-1F9102, E-1F9431, E-1F9432, E-1F9433, J-10SA, M-761-00132, M-761-00136, M-761-000167

5.2.35 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B.

Cable 11SES01AA is a power cable associated with panel SE054A, which is associated with SR monitor SENE0031. Cables 11SES01BB and 11SES01BC are control cables associated with SE054A. Cable 11SES07BB is an instrument cable associated with SENY0060B. Cable 15SES05AA is an instrument cable that runs from SE054A to RL003 and provides control room indication for SENE0031. Cable 15SES05BA is an instrument cable that runs from SE054B to RL003 and provides control room indication for SENE0032.

Damage to these cables could prevent operation of the associated source range monitor or prevent source range indication in the control room. Source Range monitoring remains available for a fire in area C-21 using SENY0061A/B.

For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013.

References: E-15000, XX-E-013, E-13NN01, E-13SE01, E-13SE05, E-13SE07, E-1F9101, E-1F9421

5.2.36 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

Cables 11NFK01CA, 11NFK01DA, 13NFK01CA and 13NFK01DA associated with two of the four undervoltage relays on each bus run in area C-21. Also, cables 11NFY01EA, 11NFY01FA, 13NFY01GA and 13NFY01HA associated with two of the four degraded voltage PTs on each bus are run in fire area C-21. Cables associated with the remaining two UV relays and PTs do not run in fire area C-21. Therefore, automatic functioning of the bus NB01 and NB02 emergency load shed/sequencer is unaffected by a fire in area C-21 due to the availability of at least two UV relay inputs.

A spurious actuation of the load shedder/sequencer due to damage to cables associated with two of the four UV relays will not adversely impact the ability to achieve and maintain safe shutdown. The load shedder will shed all safety related and non-safety related loads from the bus and start the diesel generator. Safety-related loads will then be sequenced back onto the bus in a pre-determined order. In addition, based on Section 5.2.2, a spurious SIS and CSAS could occur, causing the LOCA sequencer to actuate. Section 5.2.2 discusses mitigation of a spurious SIS and CSAS.

Based on Calculation XX-E-013, Appendix 2, an actual loss of off-site power could occur on Train A while Train B off-site power remains available. In the event of a spurious undervoltage signal that causes the load shedder/sequencer to actuate, operators can re-align Train B off-site power from the control room, if necessary, to energize required PFSSD loads.

Separation groups 1 and 3 power supply cables for load shedder/sequencer logic and input cabinets NF039A, NF039B and NF039C run in fire area C-21. Damage to these cables could cause a loss of Train A DC and AC power to the panels. Redundant Train B DC and AC power is available from separation groups 2 and 4 power supplies.

Based on the above discussion, damage to cables associated with the load shedder/sequencer will not adversely impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11NB01, E-11NB02, E-12NF01, E-13NF01, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, E-1F9402A, E-1F9402B, E-1F9403, E-1F9425, E-1F9426

5.2.37 Letdown Isolation Valves

Valves BGLCV0459 and BGLCV0460 are isolation valves installed in series on the inlet side of the regenerative heat exchanger. PFSSD requires that either of these valves be closed.

Cables 15BGK10AA, 15BGK10AC and 15BGK10AD are power/control cables for the BGLCV0459 solenoid valve (BGHY0459). Air supplied by an open (energized) solenoid valve will open valve BGLCV0459. A closed (de-energized) solenoid valve will cause loss of air pressure and closure of valve BGLCV0459.

Cables 15BGK10BA, 15BGK10BC and 15BGK10BD are power/control cables for the BGLCV0460 solenoid valve (BGHY0460). Air supplied by an open (energized) solenoid valve will open valve BGLCV0460. A closed (de-energized) solenoid valve will cause loss of air pressure and closure of valve BGLCV0460.

Either BGLCV0459 or BGLCV0460 must be closed or letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C must be closed. The cables for BGLCV0459 or BGLCV0460 are run in a common enclosure in cable trays. A hot short on the cables could cause the valves to open. A hot short on cables 15BGK10AA and 15BGK10BA prevents closing BGLCV0459 and BGLCV0460 from the control room. Other cables run in the cable trays have the proper voltage for hot shorts which can bypass MCB hand switches for BGLCV0459 and BGLCV0460. BGLCV0459 and BGLCV0460 constitute a high/low pressure interface. Therefore, multiple simultaneous hot shorts must be considered.

Letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C are listed as PFSSD components because of the interlock between these valves and BGLCV0459 and BGLCV0460. The interlock prevents closure of the letdown valves when any one or more orifice isolation valves are open. Cables associated with all three letdown orifice isolation valves are located in this fire area. Damage to these cables could prevent closure of the valves from the control room. Therefore, a fire in area C-21 could prevent closure of all three letdown orifice isolation valves (BGHV8149A, BGHV8149B, and BGHV8149C) as well as the two letdown isolation valves (BGLCV0459 and BGLCV0460) using their respective hand switches in the control room.

Cable 15RLK01AA supplies 125 VDC power from breaker PK5117 to several non-safety related components on panel RL001/RL002. Some of these components are credited for PFSSD. These components are BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B and BGHV8149C. Damage to this cable will de-energize power to these valves, failing them closed which is the desired PFSSD position. If letdown is needed during cold shutdown, the excess letdown flowpath can be used or a cold shutdown repair made to restore normal letdown. Therefore, damage to this cable will not adversely impact PFSSD.

See Section 5.1.1 for discussion of power to relays BGLCV0459X and BGLCV0460X.

Section III.G.2 separation requirements for BGLCV0459 and BGLCV0460 are not satisfied (redundant cables are routed in common raceway). However, BGLCV0459 and BGLCV0460 can be closed by locally closing KAV0201 in fire area A-25. Based on WCNOC-CP-002, letdown flow needs to be isolated within 50 minutes if a fire occurs in this area. E-1F9900 documents the feasibility and reliability that this action can be completed within 50 minutes. The OMA was approved by the NRC in License Amendment 191. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 6.

References: E-15000, XX-E-013, E-13BG10, E-13BG35, E-13SC12, E-1F9301, M-12BG01, WCNOC-CP-002, E-1F9900, License Amendment 191, DCP 13324

5.2.38 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs.

Three control cables associated with reactor coolant pumps A and B are run in fire area C-21. Damage to these cables in the event of a fire could prevent operators from stopping the A and B RCPs from the control room. However, a fire in C-21 will not cause a loss of all seal cooling since RCP seal injection remains available.

Based on the above discussion, the inability to trip the A and B RCPs from the control room will have no adverse impact on PFSSD. The pumps can continue to operate, providing forced flow circulation. If the pumps spuriously stop, natural circulation cooldown can be used.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1

5.2.39 Normal Pressurizer Spray

The normal pressurizer spray valves are included in the PFSSD design because spurious operation of pressurizer sprays can cause a decrease in pressure which can lead to boiling in the core. The pressurizer spray valves are part of the pressurizer pressure control system.

The pressurizer normal spray valves (BBPCV0455B and BBPCV0455C) operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

Instrument cables 11BBI16KB and 13BBI16MB associated with pressurizer pressure transmitters BBPT0455 and BBPT0457 are run in fire area C-21. Damage to these cables could send a spurious high-pressure signal to the pressurizer pressure control system. As discussed in Calculation XX-E-013, Appendix 1, the Ovation pressurizer pressure control system uses 4-channel verification from all four pressurizer pressure transmitters to operate the pressurizer PORVs. Failure of a single channel will not cause the spurious operation of the PORVs since the system uses the 2nd highest input as the validated signal. Damage to two channels will not cause the PORVs to open because both channels would have to fail to the exact same value at the exact same time and therefore this failure mode is not credible, as discussed in XX-E-013.

Cable 15BBI19AA associated with pressurizer spray valve BBPCV0455B, and cable 15BBI19BA associated with pressurizer spray valve BBPCV0455C are run in this area. Damage to these cables could cause the spurious opening of the spray valves.

Cables 15SCR15RF and 15SCR15RG are Ethernet cables that provide data communication between panels RP047 and RP043. These cables support functionality of pressurizer spray valves. Damage to these data cables will not result in spurious operation of the valves.

As discussed in Section 5.2.38, RCPs A and B may not stop using the hand switches in the control room. The C and D RCPs can be stopped from the control room. As stated in XX-E-013, with the D RCP stopped, the spray flow would be reduced. Therefore, operators could stop the D RCP to reduce the spray flow but the flow may not be completely eliminated.

The pressurizer spray valves are electro/pneumatic operated and loss of air pressure will close the valves. The air supply comes from the compressed air system. Closing valve KAV0201 will remove air from the pressurizer spray valves and close the valves. As discussed in

Section 5.2.40, valve KAFV0029 may not close from the control room. Based on WCNOC-CP-002, spray flow needs to be stopped within 50 minutes. E-1F9900 documents the feasibility and reliability that this action can be completed within 50 minutes. The OMA was approved by the NRC in License Amendment 191. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 36.

Based on the above discussion, the pressurizer spray valves could spuriously open if a fire occurs in this area but the valves can be closed by closing KAV0201 to isolate air to containment. Pressurizer pressure indication is available using BBPI0456 and BBPI0458 located on RL002.

References: E-15000, XX-E-013, E-13BB19, E-13SC03, M-12KA01, M-761-02128, M-761-02129, WCNOC-CP-002, E-1F9900, License Amendment 191, DCP 13324

5.2.40 Containment Air Supply

Valve KAFV0029 is an isolation valve on the containment compressed air supply line. This valve is credited for PFSSD in the event of a fire in certain areas to isolate air to letdown isolation valves BGLCV0459 and BGLCV0460 and pressurizer spray valves BBPCV0455B and BBPCV0455C to fail the valves closed. Valve KAFV0029 is a diverse means of closing these valves if the fire prevents closing the valves using their respective control room hand switches.

Cables 11KAK02AA and 11KAK02AB are control cables associated with valve KAFV0029. Damage to these cables could prevent closure of the valve from the control room or could cause the valve to spuriously close. If the valve spuriously closes, PFSSD will not be affected as documented in E-1F9900.

As discussed in Sections 5.2.37 and 5.2.39, a fire in area C-21 may require closure of the air supply to containment to achieve PFSSD. Letdown isolation valves BGLCV0459 and BGLCV0460 could be affected by a fire in this area and may not close using their control room hand switches. In addition, pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open in the event of a fire in this area and the valves may not close using their hand switches in the control room.

Based on the above discussion, damage to cables 11KAK02AA and/or 11KAK02AB could prevent isolation of the air supply to containment from the control room to close BGLCV0459, BGLCV0460, BBPCV0455B and BBPCV0455C. However, valve KAV0201 can be used to isolate air to containment if necessary. Therefore, damage to these cables will have no adverse impact on the ability to achieve and maintain safe shutdown following a fire in this area.

References: E-15000, XX-E-013, E-13KA02, E-1F9900

5.2.41 Steam Generator Feedwater Pumps

Main feedwater pump steam supply valves FCFV0005 and FCFV0105 are credited in the PFSSD analysis to trip the main feedwater pumps if the main steam isolation valves (MSIVs) are affected by a fire. Closing the MSIVs stops steam flow to the feedwater pumps' turbines and stops the feedwater pumps. The steam generator feedwater pumps are tripped in the event of a fire to prevent overfilling the steam generators.

Non-Class 1E 120 VAC Inverter PN09 and distribution panel PN09A provide power to FCFV0005 trip relays in panel FC169C. Cable 15FCQ29AE runs from control room hand switches FCHS0018A and FCHS0018B to panel FC169A. This cable provides the signal to close FCFV0005 when both hand switches are simultaneously depressed. Cable 15FCY35AA provides the primary source of 120 VAC power from distribution panel PN09A to panel FC169A, which distributes power to the trip relays in panel FC169C. The alternate source of power to panel FC169A is not credited for PFSSD and is assumed lost.

A fire in area C-21 could damage cables 15FCQ29AE and 15FCY35AA. If this occurs, operators in the control room would not be able to close valve FCFV0005 to stop steam flow to steam generator feedwater pump PAE01A.

A fire in area C-21 will not affect the ability to close the MSIVs from the control room. All-close hand switch ABHS0079 is unaffected and can be used to close the MSIVs from the control room.

Based on the above discussion, valve FCFV0005 may not close if a fire occurs in this area. However, the MSIVs can be closed using hand switch ABHS0079 in the main control room. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-13FC29A, E-13FC35, E-13RP10, E-1F9103, E-1F9421

5.2.42 Load Center Feeder Breakers PA0105 and PA0106 and MCC Feeder Breakers PG1101 and PG1901

Load center feeder breakers PA0105 and PA0106 are credited for PFSSD because they supply power to credited non-safety related loads. Cables 15PGA10AC, associated with PA0105, and 15PGA10BC associated with PA0106, run in this area. Cable 15PGG13AA associated with PG1101 is run in this area. Cable 15PGG13DA associated with PG1901 is run in this area. A fire induced short circuit in these cables will trip the associated breaker.

Breakers PA0105 and PG1101 supply power to the following PFSSD components:

- PG11JFR2 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0031
- PG11KBR3 – Auxiliary Steam System Control Valve FBHV0081

PG11JFR2 and PG11KBR3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using hand switch ABHS0079. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Based on the above discussion, loss of breakers PA0105 or PG1101 will not adversely affect PFSSD if a fire occurs in this area.

Breakers PA0106 and PG1901 supply power to the following PFSSD components:

- PG19GCR217 – MCB Misc. Power Circuits RL023
- PG19GFR3 – Instr. Bus Transformer Alt. Feed XPN07D

PFSSD components supplied power from PG19GCR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG19GFR3 is credited as one source of power to 120 VAC distribution switchboard PN07. The redundant source of power from NG01BEF4 could also be affected by a fire in this area. Distribution switchboard PN08 is unaffected by a fire in this area and is available to supply 120 VAC to redundant PFSSD equipment.

Based on the above discussion, loss of breakers PA0106 or PG1901 will not adversely affect PFSSD if a fire occurs in this area.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-13PG10, E-1F9421, E-1F9424E, KD-7496

FIRE AREA C-22

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-22 is located on the 2073 elevation of the Control Building and includes the rooms listed in Table C-22-1.

Table C-22-1
Rooms Located in Fire Area C-22

ROOM #	DESCRIPTION
3801	Upper Cable Spreading Room

Fire area C-22 is protected with an automatic wet-pipe sprinkler system. In addition, automatic fire detection is installed throughout. The automatic suppression and detection system meets the requirements of 10CFR50, Appendix R, Section III.G.2. The area is separated from adjacent areas by minimum 3-hour fire resistant construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-22-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-22-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-22

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Steam generators B and D ARV control from the main control room may be lost. Steam generator ARVs A and C are unaffected. Cooldown is assured using motor driven auxiliary feedwater pump A supplying steam generator C. Steam generator B ARV control can be achieved using ABPIC0002B at the auxiliary shutdown panel (RP118B). Steam generator D ARV can be closed using ABPIC0004B at the auxiliary shutdown panel (RP118B). Steam line pressure transmitters ABPT0516 and ABPT0546 could be affected. In addition, steam line pressure indicators ABPI0515A, ABPI0516A, ABPI0525A, ABPI0535A, ABPI0545A and ABPI0546A could be affected. Remaining steam line pressure transmitters and indicators are available. ABHS0079 may not be available to close the MSIVs and MSIV bypass valves. ABHS0080 is available to close the MSIVs and MSIV bypass valves. A number of main steam valves located downstream of the MSIVs could open. This will have no adverse impact on PFSSD since the MSIVs and bypass valves can be isolated. Main steam to TDAFP valves ABHV0005 and ABHV0006 could close, preventing operation of the TDAFP. See AL discussion for auxiliary feedwater availability.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-22.
AE	Main Feedwater	H, P	All PFSSD functions associated with the main feedwater system are satisfied. Steam generator A level indication is available using AELI0501, AELI0518 and AELI0551. Steam generator B level indication is available using AELI0528 and AELI0529. Steam generator C level indication is available using AELI0503, AELI0538 and AELI0539. Steam generator D level indication is available using AELI0548 and AELI0554. Isolate all four main feedwater isolation valves using hand switch AEHS0080. The motor driven main feedwater pump PAE02 and the Train B turbine driven main feedwater pump PAE01B could spuriously start or fail to stop due to damage to associated control cables. The pumps themselves are not considered PFSSD related since they are not required to support PFSSD. Spurious start of the pumps will have no adverse impact on PFSSD since the main feedwater isolation valves can be isolated.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. The Train B MDAFP and the TDAFP are affected. The Train A MDAFP is available to supply SGs B and C, however, as stated in the AB system discussion, SG B ARV ABPV0002 may need to be controlled at the auxiliary shutdown panel (RP118B). Pressure transmitters ALPT0038 and ALPT0039 may be affected, causing a spurious swap over to ESW. This is acceptable since ESW is the safety related auxiliary feedwater source. Auxiliary feedwater suction pressure indication is available using pressure indicator ALPI0037A.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-22.

Table C-22-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-22			
System	**System Name**	**PFSSD Function***	**Comments**
BB	Reactor Coolant System	R, M, H, P, S	All PFSSD functions associated with the reactor coolant system are satisfied. All four seal water injection valves will remain open. When transferring to RHR, valve BBPV8702A may need to be manually opened, or a cold shutdown repair performed, to provide a suction source from the RCS to RHR pump A. Pressurizer PORV BBPCV0456A may open and block valve BBHV8000B may not close. If this occurs, Operators can close the PORV by placing BBHIS0456A in the CLOSE position. RCS pressure indication is available using BBPI0405. Reactor vessel head vent valve BBHV8002B could spuriously open. The remaining head vent valves are unaffected and will remain closed to isolate the head vent flow path. RCS loops 3 and 4 temperature recorders BBTR0433 and BBTR0443 could be affected. Temperature recorders and indicators on loops 1 and 2 are unaffected. Pressurizer pressure transmitter BBPT0458 could be affected. Pressurizer pressure indicators BBPI0456 and BBPI0458 could also be affected. Pressurizer pressure indicators BBPI0455A and BBPI0457 are unaffected. Pressurizer level indication is available using BBLI0459A. Pressurizer level indicator BBLI0460A could be affected. Pressurizer pressure selector switch BBPS0455F could be affected. This will not adversely impact PFSSD. Reactor coolant pumps C and D may not stop using the control room hand switch. RCP seal injection remains available to provide cooling to the RCP seals.
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. Train A Centrifugal Charging Pump (CCP) is available to provide charging flow from the RWST to the RCP seals and the BIT injection flowpath. Train B CCP miniflow valve BGHV8111 may be affected. Train A CCP miniflow valve BGHV8110 is unaffected. Train B CCP to RCP seal injection valve BGHV8357B may be affected. Train A CCP to RCP seal injection valve BGHV8357A is unaffected. Normal charging isolation valve BGHV8105 may be affected. Redundant isolation valve BGHV8106 is unaffected. VCT isolation valve BGLCV0112C may be affected but redundant valve BGLCV0112B can be isolated using BGHIS0112B. VCT level transmitter BGLT0185 may be affected. VCT level transmitter BGLT0112 is unaffected. Excess letdown valve BGHV8154B could spuriously open. Redundant valve BGHV8153B is unaffected. RCP seal flow indication is available using BGFI0215A. RCP seal flow indicator BGFI0215B may be affected.

Table C-22-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-22

System	System Name	PFSSD Function*	Comments
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blow down system are satisfied. Steam generator blow down is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C, located on the BM157 panel in the radwaste control room.
BN	Borated Refueling Water Storage System	R, M, H	The RWST is available to provide a suction source to Centrifugal Charging Pump A via valve BNLCV0112D. RWST level indication is available using BNLI0930 and BNLI0932.
EF	Essential Service Water System	H, S	All PFSSD functions associated with the Essential Service Water (ESW) system are satisfied. A number of components associated with Train B ESW may be affected. Train A ESW is available.
EG	Component Cooling Water System	S	All PFSSD functions associated with the Component Cooling Water (CCW) system are satisfied. Train B CCW may be affected. Train A CCW is available. CCW flow to the RCP thermal barrier could be temporarily disrupted due to closure of valves EGHV0062 and EGHV0071. Valves EGHV0132 and EGHV0126 can be opened from the control room to restore CCW flow to the thermal barriers. RCP seal injection is unaffected. CCW to RCP flow indicator EGFI0129 could be affected. CCW to RCP flow indicator EGFI0128 is unaffected. Valve EGHV0102 could be affected, preventing operation of Train B RHR. Valve EGHV0101 is unaffected.
EJ	Residual Heat Removal System	M, H, P	All PFSSD functions associated with Residual Heat Removal (RHR) system are satisfied. The Train B RHR pump may be affected but the Train A RHR pump is available. RHR pump B mini-flow valve EJFCV0611 is affected but RHR pump A mini-flow valve EJFCV0610 is available. Loss of RCS inventory through the RHR flow path is prevented by maintaining valves EJHV8701A and EJHV8701B closed. Valve EJHV8701A can be opened from the control room when transitioning to RHR for cold shutdown. RHR Train B to SI Pump B isolation valve EJHV8804B could spuriously open. RHR Train A to CVCS valve EJHV8804A is unaffected. Train B RHR pump discharge to RCS cold leg isolation valve EJHV8809B is affected. Train A RHR pump discharge to RCS cold leg isolation valve EJHV8809A is unaffected. Valve EJHV8840 could spuriously open. This will not affect hot standby but the valve will need to be closed prior to shutdown cooling. RHR Train B flow control valve EJHCV0607 could be affected. RHR Train A flow control valve EJHCV0606 is unaffected.

Table C-22-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-22

System	System Name	PFSSD Function*	Comments
EM	High Pressure Coolant Injection	R, M	Train B safety injection pump PEM01B could spuriously start. Injection will not occur with the reactor at normal pressure. The pump can be stopped by opening breaker NB0202, but this action is not required for PFSSD. Charging flow from CCP A to the RCS is available through the BIT by opening valves EMHV8803A and EMHV8801A. Prevent flow diversion through the SIS test line when charging through the BIT by maintaining valve EMHV8964 closed.
EN	Containment Spray	R, M	Containment spray pump PEN01B could spuriously start and valve ENHV0012 could open, causing containment spray. Pump PEN01B can be stopped by opening breaker NB0203 in area C-10. Containment spray pump PEN01A is unaffected.
EP	Safety Injection Accumulators	H	The PFSSD Decay Heat Removal function associated with the Safety Injection Accumulators is satisfied. Accumulator injection lines can be isolated by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. It may be necessary to make a containment entry to manually close EPHV8808B and EPHV8808D prior to the RCS reaching 1000 psig.
FB	Auxiliary Steam	R, H	All PFSSD functions associated with the auxiliary steam system are satisfied. Valve FBHV0080 could spuriously open. This will have no adverse impact on PFSSD since the main steam isolation valves can be isolated.
FC	Auxiliary Turbines	R, H, P	Turbine driven auxiliary feedwater pump (TDAFP) trip and throttle valve FCHV0312 may be affected. In addition, TDAFP electrical control panel FC219 could be affected. As stated in the AL system discussion, the Train A MDAFP is available. Turbine driven auxiliary feedwater pump steam trap valve FCFV0310 may not close. Uncontrolled blow down through this 1-inch line will not cause unacceptable RCS cooldown and will not impact PFSSD. Main feedwater pump turbine KFC01B and low point drain valve FCHV0103 could be affected. This will have no adverse impact on PFSSD since the main steam isolation valves can be isolated. Valve FCFV0105 may be affected. The MSIVs can be closed using all-close hand switch ABHS0080.
GD	ESW Pump House HVAC	S	The PFSSD function associated with ESW pump house HVAC is satisfied. The Train B ESW pump room ventilation system could be affected. The Train A ESW pump room ventilation system is unaffected.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-22.

Table C-22-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-22

System	System Name	PFSSD Function*	Comments
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function associated with the Control Room and Class 1E Switchgear Room Coolers is satisfied. Train B control room A/C unit SGK04B could be affected. Train A control room A/C unit SGK04A is unaffected. Train B control room A/C dampers GKHZ0040A and GKHZ0040B could be affected. Train A control room A/C dampers are unaffected. Train B class 1E electrical equipment room A/C unit SGK05B could be affected. Train A Class 1E electrical equipment room A/C unit SGK05A is unaffected.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-22.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function associated with the emergency diesel generator room HVAC system is satisfied. The Train B emergency diesel generator exhaust damper GMHZ0019 could be affected. The Train A diesel generator room HVAC system is unaffected.
GN	Containment Coolers	S	The PFSSD function associated with the containment coolers is satisfied. Train B containment coolers SGN01B and SGN01D could be affected. Train A containment coolers SGN01A and SGN01C are available. Containment pressure transmitter GNPT0934 could be affected. Containment pressure indication on GNPI0934 and GNPI0936 could be affected. Containment pressure indicators GNPI0935 and GNPI0937 are unaffected.
JE	Diesel Fuel Oil	S	The PFSSD function associated with the Diesel Fuel Oil System is satisfied. The Train B emergency fuel oil transfer pump PJE01B may be affected. The Train A emergency fuel oil transfer pump PJE01A is unaffected. The Train B emergency diesel generator day tank level transmitter JELT0021 may be affected. The Train A day tank level transmitter is unaffected.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-22.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-22.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-22.
KJ	Standby Diesel Engine	S	The PFSSD function associated with the Standby Diesel System is satisfied. The Train B diesel engine may be affected. The Train A diesel engine is unaffected.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-22.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-22.

Table C-22-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-22

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function associated with the class 1E 4.16 kV system is satisfied. A loss of off-site and on-site power to NB02 may occur. Breaker 13-8, which supplies power to NB01, could spuriously open. Breaker 13-48 is available to supply off-site power to NB01. On-site power to NB01 is unaffected.
NE	Standby Diesel Generator	S	The PFSSD function associated with the standby diesel system is satisfied. The Train B standby diesel generator could be affected. The Train A standby diesel generator is unaffected.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function associated with the load shed/emergency load sequencing system is satisfied. Cables associated with two of the four undervoltage (UV) relays and degraded voltage potential transformers on Trains A and B are run in fire area C-22. Emergency load shed/sequencer operates when 2/4 UV relays sense undervoltage on the bus. A spurious UV signal will cause the load shedder/sequencer to actuate and start the associated diesel generator. A true UV condition will actuate the two unaffected UV relays. Train A off-site power remains available.
NG	480V Load Centers and MCCs	S	The PFSSD function associated with the class 1E 480 volt load centers is satisfied. A loss of off-site and on-site power to Train B 480 VAC Class 1E load centers and MCCs could occur. Off-site and on-site power to Train A 480 VAC Class 1E load centers and MCCs is available.
NK	125VDC	S	Train B class 1E 125 VDC power could be disrupted to control room panels RL001/RL002, RL005/RL006, RL017/RL018, RL019/RL020, RL021/RL022 and RL023/RL024. Train A class 1E 125 VDC power is unaffected. The normal source of power to NK02 and NK04, through the Train B 480 V distribution system, could be disrupted. 125 VDC battery sets NK012 and NK014 are unaffected. Train B class 1E 125 VDC power could be disrupted to RPS output panel SB032D. 125 VDC power is available to Train A RPS output panel SB029D.
NN	120VAC	S	The backup source of power to Train B Class 1E electrical distribution switchboards NN02 and NN04 could be affected. The normal source of power to NN02 and NN04 is unaffected due to the availability of 125 VDC battery sets NK012 and NK014. Train A Class 1E electrical distribution switchboards NN01 and NN03 are unaffected.
PA	13.8kV	S	NB02 feeder breaker PA0201 could be affected. One source of off-site power to NB01 is unaffected. Breakers PA0206 and PA0207 could be affected by a fire in this area. Redundant capability is available.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-22.
PG	480V Load Centers and MCCs	S	Power from PG20GBR217 to RL023 could be affected. Power from PG19GCR217 to RL023 is unaffected. Power to load centers PG12 and PG20 could be lost. Redundant capability remains available.

Table C-22-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-22

System	System Name	PFSSD Function*	Comments
PK	125VDC	S	The PFSSD function associated with the non-class 1E 125 VDC system is satisfied. Battery charger PK22 may be affected. Battery set PK12 will maintain 125 VDC power to PK02. Also, Train A non-class 1E 125 VDC system is unaffected.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-22.
PN	120VAC	S	Power from PN0833 to RL017/RL018 may be affected. Power from PN0835 to RL021/RL022 may be affected. Power from PN0736 and PN0738 to RL017/RL018 and RL021/RL022 is unaffected.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-22.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-22.
RL	Control Room MCB	S	The PFSSD function associated with the control room panels is satisfied. Train B Class 1E 125 VDC power to RL001/RL002, RL005/RL006, RL017/RL018, RL019/RL020, RL021/RL022 and RL023/RL024 could be disrupted. The components either fail in the desired PFSSD position or the redundant Train A component is available. Train A Class 1E 125 VDC power is unaffected. Non class 1E (separation group 6) 120 VAC power to panels RL017/RL018, RL021/RL022 and RL023/RL024 could be affected. Non class 1E (separation group 5) 120 VAC power to panels RL017/RL018, RL021/RL022 and RL023/RL024 is unaffected.
RP	Miscellaneous Control Panels	R, M, H, P, S	Power to BOP instrument racks RP053B and RP053D could be disrupted. BOP instrument racks RP053A and RP147B are unaffected. Train B 120 VAC control power to RP068 could be affected. Train A 120 VAC control power to RP068 is unaffected. Power to Group 2 Process Control Rack RP047 could be affected. This will not affect PFSSD as discussed in Section 5.2.16.
SA	ESFAS	S	ESFAS panels SA036B and SA036C could be affected, preventing CST low suction pressure swap over to ESW. This will not adversely impact PFSSD since the CST contains sufficient volume to achieve cold shutdown. Status panel inputs for ABHV0005, ABHV0006, GKHZ0040A/B, SGK04B and SGK05B could be affected. This will not adversely impact PFSSD.
SB	Reactor Protection System	R, S	All PFSSD functions associated with the reactor protection system are satisfied. Train B reactor trip switchgear SB102B could be affected. Train A reactor trip switchgear SB102A is unaffected. Reactor protection system channels 2 and 4 could be affected but channels 1 and 3 remain available.

Table C-22-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-22			
System	**System Name**	**PFSSD Function***	**Comments**
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-22.
SE	Ex-Core Neutron Monitoring	R, P	All PFSSD functions associated with the ex-core neutron monitoring system are satisfied. The source range recorder for source range monitor SENY0061B could be affected. Source range monitoring remains available using SENE0031, SENE0032 and SENY0060A/B
SY	Switchyard	S	Hand switch 1HSSY0018 could be affected, causing switchyard breaker 13-8 to open. Breaker 13-8 is one source of off-site power to NB01. The second source of power is from breaker 13-48, which is unaffected by a fire in this area.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-22.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-22. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs

Steam generator B and D ARVs ABPV0002 and ABPV0004 control could be lost. If this occurs, the ARVs can be controlled or closed using associated PICs at the auxiliary shutdown panel (RP118B).

3.1.2 Steam Generator Blowdown Isolation

Blowdown may not be isolable using BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A. Therefore, it may be necessary to isolate blow down using BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C located on BM157 in the Radwaste Control room.

3.1.3 Containment Spray Pump (OMA, refer to E-1F9900)

Containment spray pump PEN01B could spuriously start and valve ENHV0012 could open, causing containment spray. The pump can be stopped by opening breaker NB0203 in area C-10. Access is available without traversing area C-22 and emergency lighting is provided.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Main Steam Isolation Valves and MSIV Bypass Valves

The capability to isolate the MSIVs and bypass valves using hand switch ABHS0079 may be affected. The MSIVs and bypass valves can be isolated using hand switch ABHS0080.

3.2.2 Main Feedwater Isolation Valves

The capability to isolate the MFIVs using hand switch AEHS0081 may be affected. Isolate the MFIVs using hand switch AEHS0080.

3.2.3 Thermal Barrier Cooling

CCW flow to the thermal barrier cooling coils could be lost due to the spurious closure of valves EGHV0062 and EGHV0071. If this occurs, operators could open bypass valves EGHV0126 and EGHV0132 to restore thermal barrier cooling. Otherwise, operators should close EGHV0061 using EGHIS0061 to prevent a steam bubble from damaging the CCW piping. CCW to RCP flow indicator EGFI0128 is available to diagnose a loss of CCW flow to the RCP thermal barriers.

3.2.4 Volume Control Tank

Valve BGLCV0112C may not close in response to a signal from the control room. Redundant valve BGLCV0112B can be isolated using BGHIS0112B on RL001.

3.2.5 Boron Injection Tank (BIT)

If necessary, to establish an alternate makeup and boration flowpath, the Train A CCP is available to charge through the BIT and valves EMHV8801A and EMHV8803A can be opened using EMHIS8801A and EMHIS8803A.

3.2.6 Component Cooling Water

Train B CCW could be affected by a fire in this area. If this occurs, swap to Train A CCW using normal operating procedures if Train A CCW is not already running.

3.2.7 Pressurizer PORV/Block Valve

Pressurizer PORV BBPCV0456A could spuriously open and block valve BBHV8000B may not close. If this occurs, Operators can close the PORV by placing BBHIS0456A in the CLOSE position.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR

A number of Train B RHR components, including the Train B RHR pump, may be affected by a fire in this area. Use Train A RHR for shutdown cooling. Valve BBPV8702A may need to be manually opened, or a cold shutdown repair performed, when aligning Train A RHR.

Valve EJHV8840 could spuriously open in the event of a fire in this area. This will not affect hot standby, however the valve will need to be locally closed prior to entering shutdown cooling mode.

3.3.2 Safety Injection Accumulators

It may be necessary to make a containment entry to close SI Accumulator injection valves EPHV8808B and EPHV8808D if these valves are unresponsive from the control room. Otherwise, nitrogen pressure can be relieved from the tanks to prevent injection. Valves EPHV8808A and EPHV8808C are unaffected.

4.0 CONCLUSION

With some exceptions, redundant Post Fire Safe Shutdown capability exists if a severe fire occurs in area C-22. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-22.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-22

PFSSD components (S. in E-15000) located in fire area C-22 are shown in Table C-22-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table C-22-3.

Table C-22-3
PFSSD Components Located in Fire Area C-22

Room #	PFSSD Component	Component Description	Evaluation Section	Comments
3801	PN410	120 VAC Distribution Panel	5.1.1	Power to RP043 and RP047

5.1.1 120 VAC Distribution Panel PN410

120 VAC distribution panel PN410 supplies redundant power to NSSS control panels RP043 and RP047. 120 VAC distribution panel PN310 is a second source of power to RP043 and RP047.

Inverter PN04 supplies power to 120 VAC distribution panel PN410 (via cables 16PNY02AA and 16PNY02AB), which in turn supplies redundant 120 VAC power to NSSS control cabinets RP043 and RP047. Cable 16SCY12EA provides backup power to RP043 from breaker PN41001 and cable 16SCY12FA provides primary power to RP047 from breaker PN41002. For PFSSD, cabinet RP043 houses relays BGLCV0459X and BGLCV0460X, which are associated with letdown isolation valves BGLCV0459 and BGLCV0460, respectively. Cabinet RP047 includes controls for pressurizer PORVs and pressurizer spray.

Damage to cables 16PNY02AA and/or 16PNY02AB will disrupt power to panel PN410. Redundant power to RP043 and RP047 is available from 120 VAC distribution panel PN310. Therefore, loss of power to PN410 will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-1F9421, DCP 13324

5.2 PFSSD CABLE EVALUATION

Table C-22-4 lists all the PFSSD cables (S. in E-15000) located in fire area C-22. The applicable evaluation section is also listed in Table C-22-4.

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12ABI20FB	3801	ABPV0002	I	5.2.1	SG B Atmospheric Relief Valve
12ABK01AD	3801	ABHV0005	C	5.2.2	Main Steam Loop 2 To TDAFP
12ABK01BD	3801	ABHV0006	C	5.2.2	Main Steam Loop 3 To TDAFP
12ALI07KB	3801	ALPT0026	I	5.2.2	TDAFP Suction Pressure
12ALI08BA	3801	ALPT0038	I	5.2.2	ESFAS AFW Low Suction Press Transmitter
12ALI08BC	3801	ALPT0038	I	5.2.2	ESFAS AFW Low Suction Press Transmitter
12FCK23AA	3801	FCHV0312	C	5.2.2	TDAFP Mech Trip/Throttle Valve
12FCK24AE	3801	FC219	I	5.2.2	TDAFP Electrical Control Panel
12NFK01CA	3801	NF039A	C	5.2.4	Load Shed / Sequencer Ch. 1 Logic
12NFK01DA	3801	NF039B	C	5.2.4	Load Shed / Sequencer Ch. 4 Logic
12NFY01CA	3801	NF039A	P	5.2.4	Load Shed / Sequencer Ch. 1 Logic
12NFY01DA	3801	NF039B	P	5.2.4	Load Shed / Sequencer Ch. 4 Logic
12NFY01EA	3801	NF039A	C	5.2.4	Load Shed / Sequencer Ch. 1 Logic
12NFY01FA	3801	NF039B	C	5.2.4	Load Shed / Sequencer Ch. 4 Logic
12RLK01AA	3801	NK4206	P	5.2.2	125 VDC to Turbine Gen & Fdwtr Ctrl Pnl (RL005/RL006)
12RPY09AA	3801	RP053DA	P	5.2.5	120 VAC to BOP Instrumentation Rack from NN0208
12SAK21CA	3801	SA036C	P	5.2.2	125 VDC to ESFAS Channel 2 Term Cab from NK4205
12SAY21CA	3801	SA036C	P	5.2.2	120 VAC to ESFAS Channel 2 Term Cab from NN0205
12SAZ23AA	3801	ABHV0005	C	5.2.2	Main STM Loop 2 To TDAFW Pump
12SAZ23BA	3801	ABHV0006	C	5.2.2	Main STM Loop 3 To TDAFW Pump

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12SBS01BD	3801	SB029A	P	5.2.7	120 VAC to SSPS A Input Panel from NN0210
12SBS02BD	3801	SB032A	P	5.2.7	120 VAC to SSPS B Input Panel from NN0209
12SBY09DA	3801	SB042	P	5.2.7	120 VAC to Process Protection Set 2 Panel from NN0212
14ABI20HB	3801	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HJ	3801	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HL	3801	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HM	3801	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HN	3801	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI21LA	3801	ABPT0516	I	5.2.8	SG A Pressure Transmitter
14ABI21WA	3801	ABPT0546	I	5.2.8	SG D Pressure Transmitter
14ABK08DA	3801	ABUV0034	C	5.2.3	Steam Dump/Cooldown to the L.P. Condenser
14ABK08DB	3801	ABUV0034	C	5.2.3	Steam Dump/Cooldown to the L.P. Condenser
14ABK08EA	3801	ABUV0045	C	5.2.3	Steam Dump Valve to the H.P. Condenser
14ABK08EB	3801	ABUV0045	C	5.2.3	Steam Dump Valve to the H.P. Condenser
14ABK08FA	3801	ABUV0041	C	5.2.3	Steam Dump Valve to the I.P. Condenser
14ABK08FB	3801	ABUV0041	C	5.2.3	Steam Dump Valve to the I.P. Condenser
14ABK11AA	3801	ABUV0037	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11AB	3801	ABUV0037	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11BA	3801	ABUV0038	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11BB	3801	ABUV0038	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11CA	3801	ABUV0039	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11CB	3801	ABUV0039	C	5.2.3	Steam Dump Valve to the L.P. Condenser

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ABK11DA	3801	ABUV0040	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11DB	3801	ABUV0040	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11EA	3801	ABUV0036	C	5.2.3	Steam Dump/Cooldown to the L.P. Condenser
14ABK11EB	3801	ABUV0036	C	5.2.3	Steam Dump/Cooldown to the L.P. Condenser
14ABK11FA	3801	ABUV0042	C	5.2.3	Steam Dump Valve to the I.P. Condenser
14ABK11FB	3801	ABUV0042	C	5.2.3	Steam Dump Valve to the I.P. Condenser
14ABK11GA	3801	ABUV0043	C	5.2.3	Steam Dump Valve to the I.P. Condenser
14ABK11GB	3801	ABUV0043	C	5.2.3	Steam Dump Valve to the I.P. Condenser
14ABK11HA	3801	ABUV0044	C	5.2.3	Steam Dump Valve to the I.P. Condenser
14ABK11HB	3801	ABUV0044	C	5.2.3	Steam Dump Valve to the I.P. Condenser
14ABK11JA	3801	ABUV0035	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11JB	3801	ABUV0035	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK23FE	3801	ABHV0012, ABHV0015 ABHV0018, ABHV0021	C	5.2.9	Main Steam Isolation Bypass Valves
14ABK23FF	3801	ABHV0012, ABHV0015 ABHV0018, ABHV0021	C	5.2.9	Main Steam Isolation Valve ABHV0011, 14, 17, 20 Bypass Valve
14ABK23FG	3801	ABHV0012, ABHV0015 ABHV0018, ABHV0021	C	5.2.9	Main Steam Isolation Valve ABHV0011, 14, 17, 20 Bypass Valve
14ABK27AB	3801	ABHS0079	C	5.2.10	MSIV & MSIV Bypass Valves Hand Switch
14ABK28AH	3801	ABHV0017	C	5.2.10	Main Steam Isolation Valve
14ABK28BH	3801	ABHV0011	C	5.2.10	Main Steam Isolation Valve
14ABK29AH	3801	ABHV0014	C	5.2.10	Main Steam Isolation Valve
14ABK29BH	3801	ABHV0020	C	5.2.10	Main Steam Isolation Valve

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ABK30BB	3801	SA075B	P	5.2.10 5.2.12	125 VDC to MSFIS Cabinet SA075B from NK5423
14ABY31BA	3801	ABHS0064	C	5.2.3	Main Steam Dump Actuate
14AEI08NB	3801	AELT0517	I	5.2.11	SG A Narrow Range Level Transmitter
14AEI08PB	3801	AELT0527	I	5.2.11	SG B Narrow Range Level Transmitter
14AEI08QB	3801	AELT0537	I	5.2.11	SG C Narrow Range Level Transmitter
14AEI08RB	3801	AELT0547	I	5.2.11	SG D Narrow Range Level Transmitter
14AEK15AB	3801	AEHS0081	C	5.2.12	MFIV Handswitch
14AEK16AH	3801	AEFV0040	C	5.2.12	SG B Main Feedwater Isolation Valve
14AEK16BH	3801	AEFV0042	C	5.2.12	SG D Main Feedwater Isolation Valve
14AEK17AH	3801	AEFV0039	C	5.2.12	SG A Main Feedwater Isolation Valve
14AEK17BH	3801	AEFV0041	C	5.2.12	SG C Main Feedwater Isolation Valve
14ALB01B1	3801	DPAL01B	C	5.2.2	Train B Auxiliary Feedwater Pump Motor
14ALB01B2	3801	DPAL01B	C	5.2.2	Train B Auxiliary Feedwater Pump Motor
14ALB01BC	3801	DPAL01B	C	5.2.2	Train B Auxiliary Feedwater Pump Motor
14ALB01BD	3801	DPAL01B	C	5.2.2	Train B Auxiliary Feedwater Pump Motor
14ALB01BG	3801	DPAL01B	C	5.2.2	Train B Auxiliary Feedwater Pump Motor
14ALB01BP	3801	DPAL01B	C	5.2.2	Train B Auxiliary Feedwater Pump Motor
14ALB01BR	3801	DPAL01B	C	5.2.2	Train B Auxiliary Feedwater Pump Motor
14ALB01BY	3801	DPAL01B	C	5.2.2	Train B Auxiliary Feedwater Pump Motor
14ALB01BZ	3801	DPAL01B	C	5.2.2	Train B Auxiliary Feedwater Pump Motor
14ALG02AF	3801	ALHV0034	C	5.2.2	Cond Storage Tank To MDAFW Pump B
14ALG02AG	3801	ALHV0034	C	5.2.2	Cond Storage Tank To MDAFW Pump B

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALG04AF	3801	ALHV0030	C	5.2.2	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04AG	3801	ALHV0030	C	5.2.2	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04DF	3801	ALHV0033	C	5.2.2	Train B ESW to TDAFP
14ALG04DG	3801	ALHV0033	C	5.2.2	Train B ESW to TDAFP
14ALI03AA	3801	ALHV0005	I	5.2.2	MDAFP B to SG D
14ALI03AM	3801	ALHV0005	I	5.2.2	MDAFP B to SG D
14ALI03AP	3801	ALHV0005	I	5.2.2	MDAFP B to SG D
14ALI03BA	3801	ALHV0007	I	5.2.2	MDAFP B to SG A
14ALI03BC	3801	ALHV0007	I	5.2.2	MDAFP B to SG A
14ALI03BD	3801	ALHV0007	I	5.2.2	MDAFP B to SG A
14ALI03BE	3801	ALHV0007	I	5.2.2	MDAFP B to SG A
14ALI03BF	3801	ALHV0007	I	5.2.2	MDAFP B to SG A
14ALI05AA	3801	ALHV0010	I	5.2.2	TDAFP to SG B
14ALI05AM	3801	ALHV0010	I	5.2.2	TDAFP to SG B
14ALI05AQ	3801	ALHV0010	I	5.2.2	TDAFP to SG B
14ALI05BA	3801	ALHV0012	I	5.2.2	TDAFP to SG C
14ALI05BC	3801	ALHV0012	I	5.2.2	TDAFP to SG C
14ALI05BD	3801	ALHV0012	I	5.2.2	TDAFP to SG C (ALHY0012)
14ALI05BE	3801	ALHV0012	I	5.2.2	TDAFP to SG C
14ALI05BF	3801	ALHV0012	I	5.2.2	TDAFP to SG C
14ALI07HB	3801	ALPT0024	I	5.2.2	MDAFP B Suction Pressure
14ALI07HF	3801	ALPT0024	I	5.2.2	MDAFP B Suction Pressure
14ALI08CA	3801	ALPT0039	I	5.2.2	ESFAS AFW Low Suction Press Transmitter

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALI08CC	3801	ALPT0039	I	5.2.2	ESFAS AFW Low Suction Press Transmitter
14ALI09AA	3801	ALFT0007	I	5.2.2	Aux Feedwater to SG A Flow
14ALK01BA	3801	DPAL01B	C	5.2.2	Train B Auxiliary Feedwater Pump Motor
14ALY09BD	3801	ALHV0007	C	5.2.2	MDAFP B to SG A
14BBG04AC	3801	BBHV8351A	C	5.2.13	RCP A Seal Water Supply
14BBG04BC	3801	BBHV8351B	C	5.2.13	RCP B Seal Water Supply
14BBG04CC	3801	BBHV8351C	C	5.2.13	RCP C Seal Water Supply
14BBG04DC	3801	BBHV8351D	C	5.2.13	RCP D Seal Water Supply
14BBG12AF	3801	BBPV8702A	C	5.2.15	RCS Hot Leg 1 to RHR Pump A Suction
14BBG12AG	3801	BBPV8702A	C	5.2.15	RCS Hot Leg 1 to RHR Pump A Suction
14BBG12BF	3801	BBPV8702B	C	5.2.15	RCS Hot Leg 4 to RHR Pump B Suction
14BBG12BG	3801	BBPV8702B	C	5.2.15	RCS Hot Leg 4 to RHR Pump B Suction
14BBG39BC	3801	BBHV8000B	C	5.2.16	Pressurizer PORV BBPCV0456A Block Valve
14BBG39BE	3801	BBHV8000B	C	5.2.16	Pressurizer PORV BBPCV0456A Block Valve
14BBG39BH	3801	BBHV8000B	C	5.2.16	Pressurizer PORV BBPCV0456A Block Valve
14BBI16BB	3801	BBPT0406	I	5.2.17	RCS Hot Leg Wide Range Pressure
14BBI16NB	3801	BBPT0458	I	5.2.8 5.2.16 5.2.42 5.2.44	Pressurizer Pressure Transmitter
14BBK30DA	3801	BBHV8002B	C	5.2.18	RX Vessel Head Vent Valve
14BBK40BE	3801	BBPCV0456A	C	5.2.16	Pressurizer Power Operated Relief Valve
14BBK40BK	3801	BBPCV0456A	C	5.2.16	Pressurizer Power Operated Relief Valve

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BBK40BM	3801	BBPCV0456A	C	5.2.16	Pressurizer Power Operated Relief Valve
14BBK40BN	3801	BBPCV0456A	P	5.2.16	Pressurizer Power Operated Relief Valve
14BGB01BB	3801	DPBG05B	C	5.2.19	Train B Centrifugal Charging Pump Motor
14BGB01BE	3801	DPBG05B	C	5.2.19	Train B Centrifugal Charging Pump Motor
14BGG11AC	3801	BGHV8105	C	5.2.20	Charging Pumps to Regenerative HX
14BGG11DC	3801	BGHV8111	C	5.2.19	CCP B Miniflow Valve
14BGG11DD	3801	BGHV8111	C	5.2.19	CCP B Miniflow Valve
14BGG12BC	3801	BGLCV0112C	C	5.2.21	VCT Outlet Valve
14BGG12BE	3801	BGLCV0112C	C	5.2.21	BNLCV112E Interlock
14BGG52BC	3801	BGHV8357B	C	5.2.13	CCP B Discharge to RCP Seals
14BGI51BA	3801	BGFT0215B	I	5.2.13	RCP Seal Total Flow Transmitter
14BGI51DA	3801	BGLT0185	I	5.2.21	VCT Level Transmitter
14BGK48BB	3801	BGHV8154B	C	5.2.22	Excess Letdown Isolation Valve
14BMK06AA	3801	BMHV0001	C	5.2.23	SG A Blowdown to Flash Tank
14BMK06AB	3801	BMHV0001	C	5.2.23	SG A Blowdown to Flash Tank
14BMK06AC	3801	BMHV0001	C	5.2.23	SG A Blowdown to Flash Tank
14BMK06BA	3801	BMHV0002	C	5.2.23	SG B Blowdown to Flash Tank
14BMK06BB	3801	BMHV0002	C	5.2.23	SG B Blowdown to Flash Tank
14BMK06BC	3801	BMHV0002	C	5.2.23	SG B Blowdown to Flash Tank
14BMK06CA	3801	BMHV0003	C	5.2.23	SG C Blowdown to Flash Tank
14BMK06CB	3801	BMHV0003	C	5.2.23	SG C Blowdown to Flash Tank
14BMK06CC	3801	BMHV0003	C	5.2.23	SG C Blowdown to Flash Tank
14BMK06DA	3801	BMHV0004	C	5.2.23	SG D Blowdown to Flash Tank

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BMK06DB	3801	BMHV0004	C	5.2.23	SG D Blowdown to Flash Tank
14BMK06DC	3801	BMHV0004	C	5.2.23	SG D Blowdown to Flash Tank
14BNG01BC	3801	BNLCV0112E	C	5.2.19	Charging Pump B Suction from RWST
14BNG01BD	3801	BNLCV0112E	C	5.2.19	Charging Pump B Suction from RWST
14BNG03BC	3801	BNHV8812B	C	5.2.24	RWST To RHR Pump B Suction
14BNI07FA	3801	BNLT0933	I	5.2.24	Refueling Water Storage Tank Level
14EFB01SA	3801	DPEF01B	C	5.2.6	Train B ESW Pump Motor
14EFB01SB	3801	DPEF01B	C	5.2.6	Train B ESW Pump Motor
14EFB01SD	3801	DPEF01B	C	5.2.6	Train B ESW Pump Motor
14EFB01SG	3801	DPEF01B	C	5.2.6	Train B ESW Pump Motor
14EFG02CC	3801	EFHV0025	C	5.2.6	Service Water to Train A ESW Cross Connect
14EFG02CD	3801	EFHV0025	C	5.2.6	Service Water to Train A ESW Cross Connect
14EFG02CE	3801	EFHV0025	C	5.2.6	Service Water to Train A ESW Cross Connect
14EFG02CF	3801	EFHV0025	C	5.2.6	Service Water to Train A ESW Cross Connect
14EFG02DC	3801	EFHV0026	C	5.2.6	Service Water to Train B ESW Cross Connect
14EFG02DD	3801	EFHV0026	C	5.2.6	Service Water to Train B ESW Cross Connect
14EFG02DE	3801	EFHV0026	C	5.2.6	Service Water to Train B ESW Cross Connect
14EFG02DF	3801	EFHV0026	C	5.2.6	Service Water to Train B ESW Cross Connect
14EFG03AC	3801	EFHV0039	C	5.2.6	ESW A to Service Water Cross Connect Valve
14EFG03AD	3801	EFHV0039	C	5.2.6	ESW A to Service Water Cross Connect Valve
14EFG03AE	3801	EFHV0039	C	5.2.6	ESW A to Service Water Cross Connect Valve
14EFG03BC	3801	EFHV0040	C	5.2.6	ESW B to Service Water Cross Connect Valve
14EFG03BD	3801	EFHV0040	C	5.2.6	ESW B to Service Water Cross Connect Valve

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EFG03BE	3801	EFHV0040	C	5.2.6	ESW B to Service Water Cross Connect Valve
14EFG04BC	3801	EFHV0060	C	5.2.6	Train B ESW from CCW B HX
14EFG05BC	3801	EFHV0052	C	5.2.6	Train B ESW to CCW B HX
14EFG06BC	3801	EFHV0038	C	5.2.6	Train B ESW to UHS
14EFG07BC	3801	EFHV0032	C	5.2.6	Train B ESW to Containment Air Coolers
14EFG08BC	3801	EFHV0050	C	5.2.6	Train B ESW from Containment Air Coolers
14EFG09BC	3801	EFHV0034	C	5.2.6	Train B ESW to Containment Air Coolers
14EFG09DC	3801	EFHV0046	C	5.2.6	Train B ESW from Containment Air Coolers
14EFI08RA	3801	EFPT0002	I	5.2.6	Train B ESW Pump Discharge Pressure
14EFI08RB	3801	EFPT0002	I	5.2.6	Train B ESW Pump Discharge Pressure
14EFI11FA	3801	EFFT0054	I	5.2.6	Train B ESW Flow Transmitter
14EFI11FB	3801	EFFT0054	I	5.2.6	Train B ESW Flow Transmitter
14EGB01BB	3801	DPEG01B	C	5.2.14	CCW Pump B Motor
14EGB01BC	3801	DPEG01B	C	5.2.14	CCW Pump B Motor
14EGB01BD	3801	DPEG01B	C	5.2.14	CCW Pump B Motor
14EGB01BF	3801	DPEG01B	C	5.2.14	CCW Pump B Motor
14EGB01BG	3801	DPEG01B	C	5.2.14	CCW Pump B Motor
14EGB01BK	3801	DPEG01B	C	5.2.14	CCW Pump B Motor
14EGB01DB	3801	DPEG01D	C	5.2.14	CCW Pump D Motor
14EGB01DC	3801	DPEG01D	C	5.2.14	CCW Pump D Motor
14EGB01DD	3801	DPEG01D	C	5.2.14	CCW Pump D Motor
14EGB01DF	3801	DPEG01D	C	5.2.14	CCW Pump D Motor
14EGB01DG	3801	DPEG01D	C	5.2.14	CCW Pump D Motor

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EGG05BC	3801	EGHV0016	C	5.2.14	CCW B Common Header Return
14EGG05DC	3801	EGHV0054	C	5.2.14	CCW B to Common Header
14EGG07BC	3801	EGHV0102	C	5.2.15	CCW to RHR HX B Isolation
14EGG07BD	3801	EGHV0102	C	5.2.15	CCW to RHR HX B Isolation
14EGG09CC	3801	EGHV0071	C	5.2.14	CCW HX Out to RCS Ctmt Isolation
14EGG09CD	3801	EGHV0071	C	5.2.14	CCW HX Out to RCS Ctmt Isolation
14EGG10AC	3801	EGHV0062	C	5.2.14	CCW Return from RCP Thermal Barrier
14EGG10AD	3801	EGHV0062	C	5.2.14	CCW Return from RCP Thermal Barrier
14EGG18BC	3801	EGHV0127	C	5.2.14	CCW HX Out to RCS Bypass Isolation
14EGG18BD	3801	EGHV0127	C	5.2.14	CCW HX Out to RCS Bypass Isolation
14EGG18DC	3801	EGHV0133	C	5.2.14	EGHV0061 Bypass Valve
14EGG18DD	3801	EGHV0133	C	5.2.14	EGHV0061 Bypass Valve
14EGI13BA	3801	EGPT0078	I	5.2.14	CCW Pumps B and D Discharge Press
14EGI15AA	3801	EGFT0062	I	5.2.14	CCW Flow from RCP Thermal Barriers
14EGI19BA	3801	EGFI0129	I	5.2.14	CCW to RCP Flow Indicator
14EGI19BB	3801	EGFT0129	I	5.2.14	CCW to RCP Flow Transmitter
14EGK16BA	3801	EGTV0030	C	5.2.14	CCW B HX Bypass Valve
14EGK16BB	3801	EGTV0030	C	5.2.14	CCW B HX Bypass Valve
14EGK16BC	3801	EGTV0030	C	5.2.14	CCW B HX Bypass Valve
14EJB01BB	3801	DPEJ01B	C	5.2.15	RHR Pump B Motor
14EJB01BC	3801	DPEJ01B	C	5.2.15	RHR Pump B Motor
14EJG04BC	3801	EJHV8804B	C	5.2.15	RHR B Supply To SI Pump B Iso Valve
14EJG06BC	3801	EJHV8811B	C	5.2.24	Containment Recirc Sump Iso Valve

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EJG08BC	3801	EJFCV0611	C	5.2.15	RHR Pump B Miniflow Valve
14EJG09AC	3801	EJHV8840	C	5.2.15	RHR to RCS Hot Leg Loops 2 and 3
14EJG09AD	3801	EJHV8840	C	5.2.15	RHR to RCS Hot Leg Loops 2 and 3
14EJG09BC	3801	EJHV8809B	C	5.2.15	RHR to RCS Cold Leg Loops 3 & 4
14EJG09BD	3801	EJHV8809B	C	5.2.15	RHR to RCS Cold Leg Loops 3 & 4
14EMB01BB	3801	DPEM01B	C	5.2.26	Train B Safety Injection Pump Motor
14EMG02BC	3801	EMHV8803B	C	5.2.27	Charging Pump B to BIT Inlet Isolation Valve
14EMG02BD	3801	EMHV8803B	C	5.2.27	Charging Pump B to BIT Inlet Isolation Valve
14EMK04CA	3801	EMHV8843	C	5.2.27	Boron Injection Upstream Test Line
14EMK04CB	3801	EMHV8843	C	5.2.27	Boron Injection Upstream Test Line
14EMK04EA	3801	EMHV8871	C	5.2.27	SI Test Line from BIT
14EMK04EB	3801	EMHV8871	C	5.2.27	SI Test Line from BIT
14ENB01BB	3801	DPEN01B	C	5.2.28	Containment Spray Pump B Motor
14ENG03BC	3801	ENHV0012	C	5.2.28	Containment Spray Pump B Isolation Valve
14ENG03BD	3801	ENHV0012	C	5.2.28	Containment Spray Pump B Isolation Valve
14EPG02CE	3801	EPHV8808B	C	5.2.29	Accumulator Tank B Outlet Iso Valve
14EPG02CK	3801	EPHV8808B	C	5.2.29	Accumulator Tank B Outlet Iso Valve
14EPG02DE	3801	EPHV8808D	C	5.2.29	Accumulator Tank D Outlet Iso Valve
14EPG02DK	3801	EPHV8808D	C	5.2.29	Accumulator Tank D Outlet Iso Valve
14FCK21AA	3801	FCFV0310	C	5.2.30	TDAFP Steam Trap Isolation Valve
14GDG01BF	3801	DCGD01B	C	5.2.6	ESW Pump Room Supply Fan B Motor (GDHS0011)
14GDY01BA	3801	CGD01B	C	5.2.6	Train B ESW Pump Room Supply Fan

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GDY01BB	3801	CGD01B	C	5.2.6	Train B ESW Pump Room Supply Fan
14GDY01BD	3801	CGD01B	C	5.2.6	Train B ESW Pump Room Supply Fan
14GKG02BC	3801	SGK04B	C	5.2.31	Control Room A/C Unit B
14GKG02BD	3801	SGK04B	C	5.2.31	Control Room A/C Unit B
14GKG02BE	3801	SGK04B	C	5.2.31	Control Room A/C Unit B
14GKG02BF	3801	SGK04B	C	5.2.31	Control Room A/C Unit B (GKHS0040)
14GKG13BC	3801	SGK05B	C	5.2.32	Train B Class 1E Electrical Equipment Room A/C Unit
14GKG13BD	3801	SGK05B	C	5.2.32	Train B Class 1E Electrical Equipment Room A/C Unit
14GKG13BE	3801	SGK05B	C	5.2.32	Train B Class 1E Electrical Equipment Room A/C Unit
14GKG13BF	3801	SGK05B	C	5.2.32	Train B Class 1E Electrical Equipment Room A/C Unit
14GKG13BG	3801	SGK05B	C	5.2.32	Train B Class 1E Electrical Equipment Room A/C Unit
14GKG13BL	3801	SGK05B	C	5.2.32	Train B Class 1E Electrical Equipment Room A/C Unit (GKHS0103)
14GKY02BA	3801	GKHZ0040A/B	C	5.2.31	Control Room A/C Unit 4B Supply/Discharge Dampers
14GMG01BH	3801	GMHS0011B	C	5.2.33	Train B Diesel Generator Room Supply Fan Isolation Switch
14GMK04BA	3801	GMHZ0019	C	5.2.33	Train B Diesel Generator Room Exh Damper
14GMK04BB	3801	GMHZ0019	C	5.2.33	Train B Diesel Generator Room Exh Damper
14GMK04BE	3801	GMHZ0019	C	5.2.33	Train B Diesel Generator Room Exh Damper
14GNG02BD	3801	DSGN01B	C	5.2.34	Containment Cooler B Motor

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GNG02BE	3801	DSGN01B	C	5.2.34	Containment Cooler B Motor
14GNG02BF	3801	DSGN01B	C	5.2.34	Containment Cooler B Motor
14GNG02BH	3801	DSGN01B	C	5.2.34	Containment Cooler B Motor
14GNG02BJ	3801	DSGN01B	C	5.2.34	Containment Cooler B Motor
14GNG02BK	3801	DSGN01B	C	5.2.34	Containment Cooler B Motor
14GNG02DD	3801	DSGN01D	C	5.2.34	Containment Cooler D Motor
14GNG02DE	3801	DSGN01D	C	5.2.34	Containment Cooler D Motor
14GNG02DF	3801	DSGN01D	C	5.2.34	Containment Cooler D Motor
14GNG02DH	3801	DSGN01D	C	5.2.34	Containment Cooler D Motor
14GNG02DJ	3801	DSGN01D	C	5.2.34	Containment Cooler D Motor
14GNG02DK	3801	DSGN01D	C	5.2.34	Containment Cooler D Motor
14GNI05DA	3801	GNPT0934	I	5.2.8	Containment Atmosphere Pressure Transmitter
14JEG01BB	3801	DPJE01B	C	5.2.33	Train B Emergency Fuel Oil Transfer Pump Motor
14JEG01BE	3801	DPJE01B	C	5.2.33	Train B Emergency Fuel Oil Transfer Pump Motor
14JEI04BA	3801	JELT0021	I	5.2.33	Train B Emergency Fuel Oil Day Tank Level
14KJK03AH	3801	KKJ01B	C	5.2.33	Train B EDG
14KJK03AJ	3801	KKJ01B	C	5.2.33	Train B EDG
14KJK03AK	3801	KKJ01B	C	5.2.33	Train B EDG
14KJK07AE	3801	NE106	C	5.2.33	Train B EDG Control Panel
14NBB04AB	3801	NBHS0011	C	5.2.35	NB02 Synchro-scope/Selector Switch
14NBB04AD	3801	NBHS0011	C	5.2.35	NB02 Synchro-scope/Selector Switch

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NBB04AE	3801	NBHS0011	C	5.2.35	NB02 Synchro-scope/Selector Switch
14NBB04AF	3801	NBHS0011	C	5.2.35	NB02 Synchro-scope/Selector Switch
14NBB05AC	3801	NBHS0008	C	5.2.35	XNB02 to NB0209 Synch Transfer Switch
14NBB06AC	3801	NBHS0009	C	5.2.35	XNB01 to NB0212 Synch Transfer Switch
14NBB14AA	3801	NB00209	C	5.2.35	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AB	3801	NB00209	C	5.2.35	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AC	3801	NB00209	C	5.2.35	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AE	3801	NB00209	C	5.2.35	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AF	3801	NB00209	C	5.2.35	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AG	3801	NB00209	C	5.2.35	Bus NB02 Feeder Breaker NB0209 Control
14NBB15AA	3801	NB00212	C	5.2.35	Bus NB02 Feeder Breaker NB0212 Control
14NBB15AC	3801	NB00212	C	5.2.35	Bus NB02 Feeder Breaker NB0212 Control
14NEB02AL	3801	NE106	C	5.2.33	Train B Diesel Generator Control Panel
14NEB11AA	3801	NB00211	C	5.2.33	Train B D/G Feeder Breaker NB0211 Control
14NEB11AD	3801	NB00211	C	5.2.33	Train B D/G Feeder Breaker NB0211 Control
14NEK13AD	3801	NE106	C	5.2.33	Train B D/G Control Panel
14NEK13AJ	3801	NE106	I	5.2.33	Train B D/G Control Panel
14NFK01AA	3801	NF039C	P	5.2.4	Load Shed / Sequencer Ch 1 & 4 Terms
14NFK01CA	3801	NF039A	C	5.2.4	Load Shed / Sequencer Ch 1 Logic
14NFK01DA	3801	NF039B	C	5.2.4	Load Shed / Sequencer Ch 4 Logic
14NFY01EA	3801	NF039A	C	5.2.4	Load Shed / Sequencer Ch 1 Logic
14NFY01FA	3801	NF039B	C	5.2.4	Load Shed / Sequencer Ch 4 Logic
14NFY01GA	3801	NF039A	P	5.2.4	Load Shed / Sequencer Ch 1 Logic

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NFY01HA	3801	NF039B	P	5.2.4	Load Shed / Sequencer Ch 4 Logic
14NGB10AB	3801	NB00213	C	5.2.36	Breaker NB0213 to XNG02 Control
14NGB10BB	3801	NB00210	C	5.2.36	Breaker NB0210 to XNG04 Control
14NGB10SA	3801	NB00216	C	5.2.36	Breaker NB0216 to XNG06 Control
14NGG11AA	3801	NG00201	C	5.2.36	Breaker NG0201 Control
14NGG11BA	3801	NG00401	C	5.2.36	Breaker NG0401 Control
14PKK11AA	3801	PK022	C	5.2.36	NG0409 Breaker Control
14RLK01AA	3801	NK04407	P	5.2.37	125 VDC to RC & Support Sys Control Panel (RL001/RL002)
14RLK01BA	3801	NK04409	P	5.2.37	125 VDC to Turbine Gen & Fdwtr Ctrl Pnl (RL005/RL006)
14RLK01CA	3801	NK04412	P	5.2.37	125 VDC to ESF Control Panel (RL017/RL018)
14RLK01DA	3801	NK04413	P	5.2.37	125 VDC to ESF Control Panel (RL019/RL020)
14RLK01EA	3801	NK04414	P	5.2.37	125 VDC to Reactor Auxiliary Control Pnl (RL021/RL022)
14RLK01FA	3801	NK04411	P	5.2.37	125 VDC to Turbine Gen & Fdwtr Ctrl Pnl (RL023/RL024)
14RPY09BA	3801	RP053BC	P	5.2.5	120 VAC to BOP Instrumentation Rack from NN0416
14RPY09CA	3801	RP053BC	P	5.2.5	120 VAC to BOP Instrumentation Rack from NN0418
14RPY10BA	3801	RP068	P	5.2.6	120 VAC to RP068 from NG02ACR136
14SAK21BA	3801	SA036B	P	5.2.2	125 VDC to SA036B from NK5409
14SAY21BA	3801	SA036B	P	5.2.2	120 VAC to SA036B from NN0403

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14SAZ20EA	3801	GKHZ0040A/B	C	5.2.31	Status Panel SA066B Input from GKHZ0040A/B
14SAZ20GA	3801	SGK04B	C	5.2.31	Status Panel SA066B Input from SGK04B
14SAZ20HA	3801	SGK05B	C	5.2.32	Status Panel SA066B Input from SGK05B
14SAZ20NA	3801	SGK04B	C	5.2.31	Control Room A/C Unit
14SAZ20PA	3801	SGK05B	C	5.2.32	Status Panel SA066B Input from SGK05B
14SBS01DA	3801	SB029A	I	5.2.7	Solid State Protection Sys Train A Input Panel
14SBS01DB	3801	SB029A	I	5.2.7	Solid State Protection Sys Train A Input Panel
14SBS01DC	3801	SB029A	P	5.2.7	120 VAC to SSPS A Input Panel from NN0409
14SBS02DA	3801	SB032A	I	5.2.7	Solid State Protection Sys Train B Input Panel
14SBS02DB	3801	SB032A	I	5.2.7	Solid State Protection Sys Train B Input Panel
14SBS02DC	3801	SB032A	P	5.2.7	120 VAC to SSPS B Input Panel from NN0410
14SBS05BE	3801	SB032D	P	5.2.7	120 VAC to SSPS B Output Panel from NN0412
14SBS05BF	3801	SB032D	P	5.2.7	125 VDC to SSPS B Output Panel from NK4416
14SBS08AA	3801	BBLI0460A	I	5.2.42	Pressurizer Level Indication
14SBS08AB	3801	BNLT0931 GNPI936	I	5.2.24 5.2.8	RWST Level Indication Containment Pressure Indication
14SBS08AC	3801	BBTI0413B BBTI0423B	I	5.2.25	RCS Loop 1 Cold Leg Temperature RCS Loop 2 Cold Leg Temperature

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14SBS08AD	3801	ABPI0515A ABPI0525A ABPI0535A ABPI0545A AELI0502 AELI0519 AELI0549	I	5.2.11	Steam Generator A Pressure Steam Generator B Pressure Steam Generator C Pressure Steam Generator D Pressure Steam Generator B WR Level Steam Generator A NR Level Steam Generator D NR Level
14SBS08DA	3801	BGFI0215B	I	5.2.13	RCP Seal Total Flow Indicator
14SBS08DB	3801	BNLT0933 GNPI0934	I	5.2.24 5.2.8	RWST Level Indication Containment Pressure Indication
14SBS08DD	3801	ABPI0516A ABPI0546A AELI0504 AELI0517 AELI0527 AELI0537 AELI0547	I	5.2.11	Steam Generator A Pressure Steam Generator D Pressure Steam Generator D WR Level Steam Generator A NR Level Steam Generator B NR Level Steam Generator C NR Level Steam Generator D NR Level
14SBS12BA	3801	SB102B	C	5.2.38	Train B Reactor Trip Switchgear Cabinet
14SBS12BC	3801	SB102B	C	5.2.38	Train B Reactor Trip Switchgear Cabinet
14SBS16BA	3801	AELI0504A	I	5.2.11	SG D Wide Range Water Level at RP118B
14SBS16MA	3801	AELI0517X	I	5.2.11	SG A Narrow Range Water Level at RP118B
14SBS16PA	3801	AELI0537X	I	5.2.11	SG C Narrow Range Water Level at RP118B
14SBY09FA	3801	SB041	P	5.2.7	120 VAC to Process Protection Rack 4 from NN0414
14SES07BC	3801	SENY0061B	I	5.2.39	Source Range Monitoring
16ABG02BC	3801	ABHV0032	C	5.2.3	Main Stm Sup to MSR B&D 2nd Stage Iso Vlv

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16ABG22AC	3801	ABHV0046	C	5.2.3	Main Steam to Steam Seal System
16ABY18AA	3801	ABLV0050	C	5.2.3	Main Steam Header to Steam Dumps Trap Bypass
16ABY18AB	3801	ABLSH0050	C	5.2.3	Main Stm Line/Hi Pressure Trap Level Switch
16ABY18CA	3801	ABLV0052	C	5.2.3	Main Steam Header to Steam Dumps Trap Bypass
16ABY18CB	3801	ABLSH0052	C	5.2.3	Main Stm Line/Hi Pressure Trap Level Switch
16AEB20AD	3801	AEHIS0104	C	5.2.40	Motor Driven Main Feedwater Pump HIS
16BBA01CB	3801	DPBB01C	C	5.2.41	Reactor Coolant Pump C Motor
16BBA01CJ	3801	DPBB01C	C	5.2.41	Reactor Coolant Pump C Motor
16BBA01CL	3801	DPBB01C	C	5.2.41	Reactor Coolant Pump C Motor
16BBA01DB	3801	DPBB01D	C	5.2.41	Reactor Coolant Pump D Motor
16BBA01DJ	3801	DPBB01D	C	5.2.41	Reactor Coolant Pump D Motor
16BBA01DL	3801	DPBB01D	C	5.2.41	Reactor Coolant Pump D Motor
16EJI12BA	3801	EJHCV0607	I	5.2.15	RHR B Heat Exchanger Outlet Flow Control (EJHY0607)
16FBG12BC	3801	FBHV0080	C	5.2.3	Main Steam Iso to Aux Steam Reboiler
16FCQ29AE	3801	FCFV0105	C	5.2.40	Steam Generator Feed Pump B Turbine Stop Valve
16FCY08CA	3801	FCHV0103	C	5.2.3	SGFWP Turb B Main Steamline Low Pt Drain
16FCY08CB	3801	FCLSH0103	C	5.2.3	SGFWP Turb B Main Steamline Low Pt Drain
16NBA11AB	3801	PA0201	C	5.2.35	Bus NB02 Feeder Breaker PA0201 Control
16PGA10CC	3801	PA0206	C	5.2.43	Load Centers PG12, PG16 and PG26 Fdr Bkr
16PGA11AB	3801	PA0207	C	5.2.43	Load Centers PG14, PG18, PG20 and PG24 Fdr Bkr

Table C-22-4
PFSSD Cables Located in Fire Area C-22

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16PGG13AA	3801	PG1201	C	5.2.43	Load Center PG12 Feeder Breaker
16PGG13DA	3801	PG2001	C	5.2.43	Load Center PG20 Feeder Breaker
16PNY02AA	3801	PN410	P	5.1.1	120 VAC Power from PN04 to PN410
16PNY02AB	3801	PN410	P	5.1.1	120 VAC Power from PN04 to PN410
16RLY01DA	3801	PN00833	P	5.2.15	120 VAC to ESF Control Panel (RL017/RL018)
16RLY01EA	3801	PN00835	P	5.2.25	120 VAC to Reactor Auxiliary Control Pnl (RL021/RL022)
16RLY01GA	3801	PG020GBR217	P	5.2.3	120 VAC to Turbine Generator & Feedwater Control Pnl (RL023/RL024)
16SBS06BD	3801	BBPCV0456A	I	5.2.16	Pressurizer PORV
16SBS08BA	3801	BBPI0456	I	5.2.42	Pressurizer Pressure Indication
16SBS08BE	3801	AELI0552 AELI0553	I	5.2.11	Steam Generator B NR Level Steam Generator C NR Level
16SBS08DA	3801	BBPI0458	I	5.2.42	Pressurizer Pressure Indication
16SBS08FD	3801	BBPCV0456A	I	5.2.16 5.2.44	Pressurizer Pressure Control
16SBS08HC	3801	BBPCV0456A	I	5.2.16 5.2.44	Pressurizer Pressure Control
16SCY12EA	3801	RP043	P	5.1.1	120 VAC Power to RP043 from PN41001
16SCY12FA	3801	RP047	P	5.1.1	120 VAC Power to RP047 from PN41002
16SY001	3801	RP060	C	5.2.35	Site Related Master Supervisory Station

5.2.1 Steam Generator Atmospheric Relief Valves

PFSSD requires at least two steam generator atmospheric relief valves (ARVs) be controlled and the other two closed. The ARVs are pneumatically operated using air from the compressed air system (KA) or nitrogen from the nitrogen accumulators. The valves open by pneumatic pressure and close by spring action. The valves are automatically controlled by a pressure transmitter installed on the outlet side of the steam generator. Alternatively, each valve can be controlled manually from the control room or the auxiliary shutdown panel by placing the pressure indicating controller (PIC) in manual.

Cables associated with Steam Generator Atmospheric Relief Valves ABPV0001 and ABPV0003 are not run in area C-22. Cables associated with Steam Generator Atmospheric Relief Valves ABPV0002 and ABPV0004 are run in area C-22. Damage to these cables could prevent controlling ARVs ABPV0002 and ABPV0004 from the control room. Because of the fail-close design of the valve, it is unlikely that spurious signals due to cable damage will cause the valves to open. However, in the unlikely event the valves open, they can be controlled or closed using the associated PIC at the auxiliary shutdown panel (RP118B).

As discussed in Section 5.2.2, a fire in this area could affect the Train B motor driven auxiliary feedwater pump (MDAFP) and the turbine driven auxiliary feedwater pump (TDAFP). Therefore, only the Train A MDAFP is available to feed steam generators B and C. As stated above, steam generator B ARV could be affected. Therefore, the only assured PFSSD flow path is the Train A MDAFP feeding steam generator C and controlling cooldown using ABPV0003.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

Based on the above discussion and the results of Calculation WCNOC-CP-002, there is reasonable assurance that damage to the steam generator ARVs as described above will not adversely impact the ability to achieve and maintain safe shutdown if a fire occurs in area C-22.

References: E-15000, XX-E-013, E-1F9101, E-13AB20B, M-12AB01, Calculation WCNOC-CP-002

5.2.2 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire AFW demand to achieve cold shutdown.

Motor operated valves (MOVs) in the system allow operators to line up the auxiliary feedwater system as required to achieve and maintain safe shutdown. Damage to the MOV circuits due to a fire could prevent operators from lining up the system from the control room.

As shown in Table C-22-3, several PFSSD cables associated with various components of the auxiliary feedwater (AL) system runs through fire area C-22. In addition, cables 12FCK23AA and 12FCK24AE, associated with TDAFP mechanical trip and throttle valve FCHV0312 and

TDAFP control panel FC219, are run in this area. Damage to these cables could prevent operation of the TDAFP and the Train B MDAFP. In addition, motor operated valves in the flowpath from the Train B MDAFP to steam generators A and D and from the TDAFP to steam generators B and C could spuriously close. Cables associated with the Train A MDAFP, as well as the suction and discharge valves, are unaffected by a fire in this area.

Cable 12RLK01AA supplies 125 VDC power from NK4206 to RL005/RL006, where it's split and supplies control power to TDAFP main steam supply valves ABHV0005 and ABHV0006, as well as other non-PFSSD components. Damage to this cable could cause a loss of control power to these valves. Loss of control power will cause the valves to fail open, which is the desired PFSSD position. However, damage to cables 12ABK01AD and 12ABK01BD could cause ABHV0005 and ABHV0006 to close, preventing operation of the TDAFP. In addition, damage to cables 12SAZ23AA and 12SAZ23BA could cause a loss of valve position status for valves ABHV0005 and ABHV0006.

Panels SA036A, SA036B and SA036C monitor pressure transmitter signals on ALPT0037, ALPT0039 and ALPT0038, respectively. Instrument cables associated with ALPT0038 and ALPT0039 are run in this area. Damage to these cables could cause a spurious low CST pressure signal and initiate swap over to the ESW system. This is only a commercial concern and should be prevented if possible.

Power cables associated with SA036B and SA036C are run in this area. Damage to these cables could result in a loss of power to the panels and could prevent automatic operation of low suction pressure (LSP) swap over. This is acceptable since the CST contains sufficient volume to achieve cold shutdown. In addition, operators can monitor CST level using pressure indicator ALPI0037A, which is unaffected by the fire.

Based on the above discussion, auxiliary feedwater is assured if a fire occurs in area C-22 using Train A MDAFP supplying auxiliary feedwater to steam generators B and C. However, steam generator B ARV could be affected, as discussed in Section 5.2.1.

References: E-15000, XX-E-013, E-13AB01, E-13AB01A, E-13AL01A, E-13AL01B, E-13AL02B, E-13AL03A, E-13AL03B, E-13AL04B, E-13AL05A, E-13AL05B, E-13AL07B, E-13AL08, E-13AL09, E-13RL01, E-13RL03, E-13SA21, E-13SA23, E-1F9101, E-1F9202, E-1F9203, E-1F9204, E-1F9402A, E-1F9402B, E-1F9422B, E-13FC23, E-13FC24, J-10SA, M-12AB02, M-12AL01, M-12FC02

5.2.3 Main Steam Isolation Valves Downstream Components

Cables for several main steam (AB) valves located downstream of the main steam isolation valves (MSIVs) are located in this area. These valves are used for PFSSD to isolate the main steam lines in the event the MSIVs or MSIV bypass valves fail to close. Damage to these cables could cause the associated component to fail open.

Cable 16RLY01GA supplies 120 VAC power to control room panel RL023/RL024. At RL023/RL024, the power is split and supplies power to FCHV0103, ABLV0050 and ABLV0052, as well as other non-PFSSD components. These components are required to be functional for PFSSD in the event the MSIVs and MSIV bypass valves cannot be isolated. Loss of power will cause the valves to remain open.

Cable 14ABY31BA is associated with steam dump control switch ABHS0064. Damage to this cable could actuate the steam dumps.

Cable 16FBG12BC is associated with main steam to auxiliary steam reboiler isolation valve FBHV0080. Damage to this cable could prevent closing the valve. Valve FBHV0080 is required to be isolated if the MSIVs and MSIV bypass valves cannot be isolated.

As discussed in Sections 5.2.9 and 5.2.10, the MSIVs and MSIV bypass valves can be isolated using hand switch ABHS0080 if a fire occurs in area C-22. Therefore, these downstream valves can fail open with no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-13AB02B, E-13AB08, E-13AB11A, E-13AB11B, E-13AB11C, E-13AB18, E-13AB22, E-13AB31, E-13FB12, E-13FC08A, E-13RL01, E-13RL07, E-1F9103, E-1F9424E, M-12AB03, M-12FB01, M-12FC04

5.2.4 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

Cables 12NFK01CA, 12NFK01DA, 14NFK01CA and 14NFK01DA associated with two of the four undervoltage relays on each bus run in area C-22. Also, cables 12NFY01EA, 14NFY01EA, 12NFY01FA and 14NFY01FA associated with two of the four degraded voltage PTs on each bus are run in fire area C-22. Cables associated with the remaining two UV relays and PTs do not run in fire area C-22. Therefore, automatic functioning of the bus NB01 and NB02 emergency load shed/sequencer is unaffected by a fire in area C-22 due to the availability of at least two UV relay inputs.

A spurious actuation of the load shedder/sequencer due to damage to cables associated with two of the four UV relays will not adversely impact the ability to achieve and maintain safe shutdown. The load shedder will shed all safety related and non-safety related loads from the bus and start the diesel generator. Safety-related loads will then be sequenced back onto the bus in a pre-determined order. Per Section 5.2.8, a spurious SIS and CSAS cannot occur, so the LOCA sequencer mode will not spuriously actuate. The LOCA sequencer mode will actuate in the event of an actual SIS or CSAS.

Based on Calculation XX-E-013, Appendix 2, an actual loss of off-site power could occur on Train B while Train A off-site power remains available. In the event of a spurious undervoltage signal that causes the load shedder/sequencer to actuate, operators can re-align Train A off-site power from the control room, if necessary, to energize required PFSSD loads.

Separation groups 2 and 4 power cables associated with NF039A, NF039B and NF039C are run in this area. Separation groups 1 and 3 power cables associated with these panels are unaffected. Therefore, power to the load shedder/sequencer panels is available.

Based on the above discussion, damage to cables associated with the load shedder/sequencer will not adversely impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11005, E-12NF01, E-13NF01, E-10NF, E-1F9402A, E-1F9402B, E-1F9403, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, E-1F9425, E-1F9426

5.2.5 BOP Instrument Racks

BOP instrument racks RP053A, RP053B, RP053D and RP147 are credited in the PFSSD analysis. The following table identifies the PFSSD components served by each instrument rack.

Instrument Rack	PFSSD Components
RP053A (RP053AA, RP053AB, RP053AC)	ALHV0009, ALHV0011 ALPY0037A, EGFT0128, EGPSL0077, GDTSL0001, JELSL0001C
RP053B (RP053BA, RP053BB, RP053BC)	ALHV0007, ALPY0039A, EGFT0129, EGPSL0078, GDTSL0011, JELSL0021C
RP053D (RP053DA, RP053DB)	ALPY0038A
RP147 (RP147A, RP147B)	ALHV0005

Cable 12RPY09AA supplies 120 VAC power to BOP instrument rack RP053D. Damage to this cable could cause a loss of function of ALPY0038A.

Cables 14RPY09BA and 14RPY09CA supply 120 VAC power to BOP instrument rack RP053B. Damage to these cables could cause a loss of function of panel RP053B and associated PFSSD components.

Pressure converters ALPY0038A and ALPY0039A are associated with ESFAS low auxiliary feedwater suction pressure. Loss of these devices due to a fire could prevent an automatic swap over from the CST to the ESW system. The CST contains sufficient volume for PFSSD and pressure indication is available in the control room using ALPT0037. Therefore, loss of these pressure converters will not adversely impact PFSSD.

Instrument racks RP053A and RP147B are unaffected by the fire. Therefore, loss of PFSSD components associated with RP053B and RP053D will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13AL08, E-13AL09, E-13EG13, E-13JE01, E-13NN01, E-13RP09, E-1F9101, E-1F9202, E-1F9204, E-1F9401B, E-1F9411B, E-1F9411A, E-1F9424D, E-1F9443, E-K3GD01A, E-K3GD04, M-12AL01, M-12EG01, M-12JE01, M-K2GD01

5.2.6 Essential Service Water

Either the Train A or the Train B essential service water (ESW) system is required to be available to ensure PFSSD. The ESW system supplies water to the following PFSSD components on the associated train:

- CCP room cooler
- RHR pump room cooler
- Class 1E switchgear room A/C condenser
- diesel generator engine cooling
- control room A/C condenser
- auxiliary feedwater pump room cooler
- motor and turbine driven auxiliary feedwater pump suction (backup to CST)
- containment air coolers
- electrical penetration room cooler
- component cooling water pump room cooler
- component cooling water heat exchanger
- component cooling water system makeup

A number of components associated with Train B ESW system could be affected by a fire in this area. The Train B ESW pump and a number of Train B ESW control valves could spuriously operate or may not operate when required. The Train B ESW pump room supply fan and associated dampers may not operate. Therefore, the Train B ESW system cannot be relied on if a fire occurs in this area.

The service water system provides the normal source of water to the ESW piping. Service water supply to and return from the ESW piping is each controlled by two valves installed in series. One of the two valves on each leg is required to be closed for PFSSD to prevent flow diversion from the credited ESW system. As discussed in the previous paragraph, the Train B ESW system may not be available if a fire occurs in this area. One valve (EFHV0025) on the Train A service water to ESW piping supply line and one valve (EFHV0039) on the Train A ESW to service water return line may be affected by the fire and may not close on a signal from the control room. Redundant valves EFHV0023 and EFHV0041 are unaffected by the fire and will close on a signal from the control room. Therefore, the ESW/service water cross connects can be isolated if a fire occurs in this area. In addition, check valve EFV0470 is installed between valves EFHV0023 and EFHV0025 and will prevent flow diversion from Train A ESW to the service water system. Also, check valve EFV0471 is installed between valves EFHV0024 and EFHV0026 and will prevent flow diversion from Train B ESW to the service water system.

Cable 14RPY10BA supplies 120 VAC control power to the automatic and manual start circuits for the Train B ESW pump room supply fan CGD01B. The control power is supplied via this cable to control room panel RP068. If power is lost due to damage to this cable, then the Train B ESW pump room supply fan will not start either automatically, when the ESW pump starts, or manually from the control room. If this occurs, the Train A ESW pump room supply fan remains unaffected by the fire.

Cables 14GDY01BA, 14GDY01BB and 14GDY01BD are associated with Train B ESW pump room supply fan CGD01B. Damage to these cables could prevent operation of the supply fan. Train A ESW pump room supply fan CGD01A is unaffected by a fire in this area.

The Train A ESW system is unaffected by a fire in area C-22. Therefore, the Train A ESW system is available if a fire occurs in area C-22.

References: XX-E-013, E-15000, E-13EF02, E-13EF02A, E-13EF03, E-13EF04, E-13EF05, E-13EF06A, E-13EF07A, E-13EF08A, E-13EF09A, E-13EF11, E-13RP10, E-K3EF01A, E-K3EF08, E-K3GD01A, E-K3GD04, E-K3GD04A, E-1F9402A, E-

1F9402B, E-1F9403, E-1F9424B, E-1F9443, J-201-00133, M-12EF01, M-12EF02, M-K2EF01, M-K2GD01

5.2.7 Reactor Protection System

The Reactor Protection System (RPS) monitors specified input parameters and initiates reactor protection features whenever those parameters are outside specified limits. Field installed transmitters continuously monitor various parameters and report the results to one of four process cabinets, one per channel. Signals are then sent from the process cabinets to both solid state protection cabinets, one on each train. The cabinets and associated channel are listed in the following table:

Process Cabinets	Solid State Protection Cabinets
Cabinet SB038 - Channel 1 Cabinet SB042 - Channel 2 Cabinet SB037 - Channel 3 Cabinet SB041 - Channel 4	Cabinet SB029A - Train A Input Cabinet Cabinet SB029B - Train A Logic Cabinet Cabinet SB029C - Train A Output Cabinet 1 Cabinet SB029D - Train A Output Cabinet 2 Cabinet SB032A - Train B Input Cabinet Cabinet SB032B - Train B Logic Cabinet Cabinet SB032C - Train B Output Cabinet 1 Cabinet SB032D - Train B Output Cabinet 2

The RPS is actuated upon 2/3 or 2/4 coincident logic, depending on the input parameter. This ensures that a loss of a single channel will not prevent the system from performing its function. Loss of power to a single cabinet will render the channel or Train inoperative.

Cables associated with RPS channels 2 and 4 run through this area. These cables supply power from separation groups 2 and 4 power supplies to panels SB029A, SB032A, SB032D, SB041 and SB042. Power cables associated with RPS channels 1 and 3 are run in a separate fire area.

A number of instrumentation cables associated with reactor protection system channel 4 run through this area. These cables provide channel 4 signals from process cabinet SB041 to solid state protection cabinets SB029A and SB032A and from process cabinets SB041 and SB042 to main control board post-accident monitoring. Damage to these cables will not adversely impact PFSSD due to availability of channels 1, 2 and 3 diagnostic instrumentation.

Damage to cables associated with the RPS due to a fire in this area could cause a loss of RPS channels 2 and 4, but channels 1 and 3 remain available. Spurious RPS actuation due to cable damage will not adversely impact PFSSD. These spurious actuations can either be mitigated as discussed in other sections (i.e., spurious SIS and CSAS), or the spurious actuation places the plant in a safe condition as designed. Therefore, damage to these cables will not adversely impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11NK02, E-13NN01, E-13SB01, E-13SB02, E-13SB05, E-13SB08A, E-13SB08D, E-13SB09, E-1F9102, E-1F9103, E-1F9203, E-1F9205, E-1F9421, E-1F9433, E-1F9431, E-1F9432, M-761-000167

5.2.8 Safety Injection and Containment Spray

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. A spurious containment spray actuation signal (CSAS) could cause the containment spray pumps to operate, depleting inventory in the RWST. These conditions are not desirable for PFSSD at Wolf Creek.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Containment spray (CS) is initiated automatically by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937.

A cable associated with containment pressure transmitter GNPT0934 is run in area C-22. Cables associated with the remaining containment pressure transmitters are not run in area C-22. Therefore, a spurious CSAS cannot occur due to a fire in this area. Also, a spurious SIS due to high containment pressure cannot occur.

Cables associated with containment pressure indicators GNPI0934 and GNPI0936 are run in this area. Damage to these cables will prevent use of these indicators but will not initiate a spurious CSAS or SIS. Containment pressure indication remains available using GNPI0935 and GNPI0937.

A cable associated with pressurizer pressure transmitter BBPT0458 is run in area C-22. Cables associated with the remaining pressurizer pressure transmitters do not run in area C-22. Consequently, a fire in area C-22 cannot cause a spurious SIS due to low pressurizer pressure.

Cables associated with steam line pressure transmitters ABPT0516 and ABPT0546 are run in area C-22. Cables associated with the remaining steam line pressure transmitters do not run in area C-22. Consequently, a spurious two out of three logic for low steam line pressure initiation of SIS cannot be satisfied if a fire occurs in area C-22.

Based on the above discussion, a spurious SIS and CSAS cannot occur if a fire occurs in this area.

References: E-15000, XX-E-013, E-13AB21, E-13BB16, E-13GN05, E-1F9431, E-1F9432, E-1F9433, M-12AB01, M-12BB02, M-12GN01, M-761-02038, M-761-02091

5.2.9 Steam Generator Main Steam Isolation Bypass Valves

Each of the four MSIV bypass valves (ABHV0012, ABHV0015, ABHV0018 and ABHV0021) has two redundant solenoids that control the position of the associated bypass valve. The bypass valves are normally closed with the solenoids de-energized. Both solenoids need to be energized to open the valve. One of the solenoids on each valve is on separation group 1 (Train A) and are controlled by hand switch ABHS0080. The other solenoids on each valve are on separation group 4 (Train B) and are controlled by hand switch ABHS0079.

Cable 14ABK23FE is associated with steam line isolation signal relay K627. Upon receipt of a steam line isolation signal, the relay contact opens and the bypass valves close. An open circuit in one of the two conductors will produce the same result as a steam line isolation signal, which is desired for PFSSD. A hot short between the conductors will bypass the contact and prevent a steam line isolation signal from closing the valves.

Cable 14ABK23FF is associated with handswitch ABHS0079 on the Train B MSIV bypass valve control circuit. An open circuit in one of the two conductors will de-energize the respective solenoid and close the bypass valves. A hot short between the conductors will bypass the handswitch contact and prevent closure of the valves using the handswitch.

Cable 14ABK23FG is associated with reset switch ABHS0100 on the Train B MSIV bypass valve control circuit. An open circuit will have no impact on the ability to close the bypass valves. A hot short between the conductors will act as a reset signal and maintain the auxiliary relay energized, maintaining the four Train B bypass valve solenoids energized and therefore providing the Train B permissive to open the valves.

Redundant means are available to ensure the MSIV bypass valves are closed. Hand switch ABHS0080 is unaffected by the fire and can be used to ensure one of the two solenoids on each bypass valve are de-energized.

References: E-15000, XX-E-013, E-13AB23B, E-1F9101, M-12AB02

5.2.10 Steam Generator Main Steam Isolation Valves (MSIVs)

PFSSD requires the MSIVs be closed to prevent reactivity addition due to uncontrolled cooldown. The MSIVs are closed from the control room using all close hand switches ABHS0079 or ABHS0080.

Each MSIV is designed to utilize system fluid (main steam) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main steam. This is done by actuating either all close hand switch ABHS0079 (separation group 4) or ABHS0080 (separation group 1) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MSIV	ABHS0079 (Sep Group 4)		ABHS0080 (Sep Group 1)	
	Solenoids	Cable	Solenoids	Cable
ABHV0011	MV2, MV4, MV6	14ABK28BH	MV1, MV3, MV5	11ABK29BH
ABHV0014	MV2, MV4, MV6	14ABK29AH	MV1, MV3, MV5	11ABK28AH
ABHV0017	MV2, MV4, MV6	14ABK28AH	MV1, MV3, MV5	11ABK29AH
ABHV0020	MV2, MV4, MV6	14ABK29BH	MV1, MV3, MV5	11ABK28BH

All 4 cables associated with the 12 separation group 4 solenoid valves are run in area C-22. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 1 cables associated with hand switch ABHS0080 are unaffected by a fire in area C-22. Therefore, hand switch ABHS0080 is available to close the four MSIVs.

Cable 14ABK30BB provides 125 VDC power to Train B main steam and feedwater isolation actuation system (MSFIS) cabinet SA075B from NK5423. Damage to this cable would disrupt power to the separation group 4 solenoids and close the MSIVs, which is the desired PFSSD position. In addition, the Train A MSFIS is unaffected by the fire and ABHS0080 is available to close the MSIVs.

Based on the above discussion, hand switch ABHS0080 is available to close the MSIVs in the event of a fire in area C-22.

References: E-15000, XX-E-013, E-13AB27, E-13AB28, E-13AB29, E-13AB30, E-1F9101, M-12AB02

5.2.11 Steam Generator Level and Pressure Indication

The decay heat removal function for PFSSD requires the use of two RCS loops and two Steam Generators. Steam generator (SG) level indication is required to support this function. A fire in area C-22 uses MDAFP A to supply SGs B and C. Therefore, level indication on steam generators B and C is required.

Diagnostic indication of steam line pressure is also required for PFSSD. Steamline pressure indication is used to determine if a steam generator ARV is stuck open, verification of heat removal per EMG ES-04, and verification of an actual SIS per EMG E-0. Section 5.2.8 discusses steam line pressure SIS initiation, whereas this section discusses availability of steam line pressure indication on the MCBs.

Cables associated with level transmitters AELT0517 (SG A NR), AELT0527 (SG B NR), AELT0537 (SG C NR) and AELT0547 (SG D NR) run in this area. In addition, cables associated with level indicators AELI0502 (SG B WR), AELI0504 (SG D WR), AELI0517 (SG A NR), AELI0519 (SG A NR), AELI0527 (SG B NR), AELI0537 (SG C NR), AELI0547 (SG D NR), AELI0549 (SG D NR), AELI0552 (SG B NR) and AELI0553 (SG C NR) run in this area. Consequently, steam generator level indication on these level indicators could be affected. Alternate level indication remains available on all four SGs using the following level indicators:

Steam Generator	Available Level Indication
A	AELI0501 (WR), AELI0518 (NR), AELI0551 (NR)
B	AELI0528 (NR), AELI0529 (NR)
C	AELI0503 (WR), AELI0538 (NR), AELI0539 (NR)
D	AELI0548 (NR), AELI0554 (NR)

Circuits associated with steam generator level indication at the auxiliary shutdown panel (RP118B) are run in area C-22. Damage to these circuits will affect AELI0504A (SG D Wide Range Level Indicator at RP118B), AELI0517X (SG A Narrow Range Level Indicator at RP118B) and AELI0537X (SG C Narrow Range Level Indicator at RP118B). Damage to these circuits will not impact the redundant level indicators in the main control room.

As discussed in Section 5.2.8, cables associated with steam line pressure transmitters ABPT0516 and ABPT0546 are run in fire area C-22. In addition, cables associated with steam line pressure indicators ABPI0515A, ABPI0516A, ABPI0525A, ABPI0535A, ABPI0545A and ABPI0546A are run in this area. Consequently, steam line pressure indication in the MCR for

these transmitters and indicators will not be available. Alternate steam line pressure indication remains available using the pressure indicators in the following table:

Steam Generator	Available Pressure Indication
A	ABPI0514A
B	ABPI0524A, ABPI0526A
C	ABPI0534A, ABPI0536A
D	ABPI0544A

Based on the above discussion, steam generator level indication and main steam line pressure indication is available on all four steam generators if a fire occurs in fire area C-22.

References: E-15000, XX-E-013, E-13AE08, E-13SB08D, E-13SB16, E-1F9203, M-12AE02, M-761-00135

5.2.12 Steam Generator Main Feedwater Isolation Valves

PFSSD requires that either the main feedwater isolation valves (MFIVs) be closed or the main feedwater pumps be stopped to prevent overfilling the steam generators. Flow diversion from auxiliary feedwater (AFW) to the main feedwater system piping is prevented by check valves AEV0420, AEV0421, AEV0422 and AEV0423. Closure of the main feedwater isolation valves is not required to prevent AFW flow diversion.

Each MFIV is designed to utilize system fluid (feedwater) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main feedwater. This is done by actuating either all close hand switch AEHS0080 (separation group 1) or AEHS0081 (separation group 4) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MFIV	AEHS0080 (Sep Group 1)		AEHS0081 (Sep Group 4)	
	Solenoids	Cable	Solenoids	Cable
AEFV0039	MV1, MV3, MV5	11AEK16AH	MV2, MV4, MV6	14AEK17AH
AEFV0040	MV1, MV3, MV5	11AEK17AH	MV2, MV4, MV6	14AEK16AH
AEFV0041	MV1, MV3, MV5	11AEK16BH	MV2, MV4, MV6	14AEK17BH
AEFV0042	MV1, MV3, MV5	11AEK17BH	MV2, MV4, MV6	14AEK16BH

All 4 cables associated with the 12 separation group 4 solenoid valves are run in area C-22. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 4 cables associated with hand switch AEHS0080 are unaffected by a fire in area C-22. Therefore, hand switch AEHS0080 is available to close the four MFIVs.

Cable 14AEK15AB is a control cable associated with hand switch AEHS0081. An open circuit will prevent closing the MFIVs using this hand switch. A hot short will cause the valves to close, which is the desired PFSSD position. Hand switch AEHS0080 is unaffected by the fire.

Cable 14ABK30BB provides 125 VDC power to Train B main steam and feedwater isolation actuation system (MSFIS) cabinet SA075B from NK5423. Damage to this cable would disrupt

power to the separation group 4 solenoids and close the MFIVs, which is the desired PFSSD position. In addition, the Train A MSFIS is unaffected by the fire and AEHS0080 is available to close the MFIVs.

Based on the above discussion, MFIV isolation is assured using hand switch AEHS0080.

References: E-15000, XX-E-013, E-13AB30, E-13AE14, E-13AE15, E-13AE16, E-13AE17, E-1F9201, J-104-00295, J-104-00296, M-12AE02, M-630-00044

5.2.13 Reactor Coolant Pump (RCP) Seal Injection

PFSSD requires RCP seal injection to provide a boron injection path, provide makeup to the RCS to maintain hot standby inventory and prevent damage to the RCP seals. The Component Cooling Water (CCW) system is an alternative means of cooling the RCP seals.

A fire in area C-22 could damage power and control cables associated with all four RCP seal injection valves (BBHV8351A, BBHV8351B, BBHV8351C and BBHV8351D). The seal injection valves are normally open and de-energized with the circuit breaker maintained in the OFF position. The valves are not high/low pressure interface valves so three-phase hot shorts do not have to be considered and, consequently, damage to the power cables will not cause the valves to spuriously close. Damage to the control cables will not cause the valves to close because the power and control circuits are de-energized. Therefore, a fire in this area will not cause the seal injection valves to close.

Cable 14BGG52BC is associated with CCP B to RCP seal injection valve BGHV8357B. Redundant Train A CCP to RCP seal injection valve BGHV8357A is unaffected.

Cable 14BGI51BA is associated with RCP seal total flow transmitter BGFT0215B. Cable 14SBS08DA is associated with RCP seal total flow indicator BGFI0215B. Damage to these cables could cause a loss of seal flow indication on BGFI0215B. RCP seal total flow indicator BGFI0215A is unaffected by a fire in area C-22 and can be used to diagnose a loss of the operating charging pump.

Based on the above discussion, RCP seal injection is available. RCP seal total flow indicator BGFI0215A can be used to diagnose a loss of the operating charging pump.

References: E-15000, XX-E-013, E-13BB04, E-13BG51, E-13BG52, E-13SB08D, E-1F9102, E-1F9302, E-1F9303, M-12BB03, M-12BG03

5.2.14 Component Cooling Water

The component cooling water system is required for PFSSD to provide cooling water to the CCP oil coolers, seal water heat exchanger, RHR heat exchanger, RHR pump seal cooler and RCP thermal barriers (to maintain RCP seal cooling in the event RCP seal injection is lost). In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Cables associated with components on the Train B CCW system run through area C-22. Damage to these cables due to a fire could prevent operation of the associated equipment and prevent operation of Train B CCW. Cables associated with redundant Train A CCW are run in a different fire area and are unaffected by the fire.

To ensure an operable flow path, either valves EGHV0071 or EGHV0126 must be open and either EGHV0058 or EGHV0127 must be open. In addition, either valves EGHV0062 or EGHV0132 must be open and either EGHV0061 or EGHV0133 must be open. Also, valve EGHV0015 needs to be open when operating the Train A CCW system to ensure a return flow path to the suction side of the CCW pumps.

Cables associated with valves EGHV0062, EGHV0071, EGHV0127 and EGHV0133 run through area C-22. If the fire affects cables associated with EGHV0062 and EGHV0071, the valves may spuriously close. This can be mitigated by opening valves EGHV0132 and EGHV0126 using associated hand switches EGHIS0132 and EGHIS0126 on RL020.

Cable 14EGI19BA is associated with CCW to RCP flow indicator EGFI0129. Cable 14EGI19BB is associated with CCW to RCP flow transmitter EGFT0129. Damage to these cables could prevent operation of EGFI0129. CCW to RCP flow indicator EGFI0128 is unaffected and can be used to diagnose a loss of CCW flow to the thermal barriers. Cable 14EGG05BC associated with EGHV0016 and cable 14EGG05DC associated with EGHV0054 are run in this area. If Train B CCW is operating at the time of the fire, these valves will be open. If it is necessary to swap to Train A CCW, these valves will need to be closed to prevent flow diversion to Train B CCW and potential loss of suction to the Train A CCW pumps. If the fire damages these cables, the valves may not respond to a close signal and one or both of these valves may remain open when operating the Train A CCW system.

Calculation M-EG-24 determines the amount of inventory lost from one train of CCW to the other train given a single failure of EGHV0015, EGHV0016, EGHV0053 or EGHV0054. The calculation also evaluates the impact on CCW pump NPSH given these failures. Based on the results of the calculation, there is no adverse impact on NPSH if a single failure occurs. In the case where both valves remain open, PFSSD is assured because, if EGHV0054 is open, check valve EGV0061 will prevent flow diversion from Train A to Train B CCW.

Based on the above discussion, Train A CCW is available to provide cooling to essential PFSSD components as well as provide cooling to the RCP thermal barriers. Flow indicator EGFI0128 is available to diagnose a loss of CCW flow to the RCP thermal barriers.

References: E-15000, XX-E-013, E-13EG01C, E-13EG01D, E-13EG05A, E-13EG05B, E-13EG07, E-13EG07A, E-13EG09, E-13EG10, E-13EG13, E-13EG15, E-13EG16, E-13EG18, E-13EG18A, E-13EG19, E-1F9303, E-1F9401A, E-1F9401B, M-12EG01, M-12EG02, M-12EG03, Calculation M-EG-24

5.2.15 Residual Heat Removal (RHR)

PFSSD requires one train of residual heat removal (RHR) to be available for shutdown cooling. The RHR system is not used for hot standby.

Hot shutdown requires isolation of the RCS to RHR flow path by maintaining either BBPV8702A or EJHV8701A closed and either BBPV8702B or EJHV8701B closed. Cold shutdown requires RHR taking suction from the RCS. RHR pump suction from the RCS is controlled by valves BBPV8702A and EJHV8701A (Train A) and BBPV8702B and EJHV8701B (Train B). The PFSSD strategy credits Train A RHR to achieve cold shutdown if a fire occurs in area C-22.

Control cables associated with RHR pump B (PEJ01B) could be damaged, causing a spurious pump start or preventing the pump from being started. Cables associated with RHR pump A are unaffected by a fire in area C-22.

Cables 14BBG12AF and 14BBG12AG are control cables associated with BBPV8702A. An inter-cable (cable-to-cable) hot short between cables 14BBG12AF and 14BBG12AG will bypass the control room hand switch and provide the permissive to open BBPV8702A. Valve EJHV8701A will remain closed since cables associated with this valve are not run through area C-22. Furthermore, BBPV8702A and EJHV8701A are administratively maintained closed with the breaker locked open. The 3-phase power cables associated with both valves are not run in this area, so a 3-phase hot short is not credible.

Cables 14BBG12BF and 14BBG12BG are control cables associated with BBPV8702B. An inter-cable (cable-to-cable) hot short between cables 14BBG12BF and 14BBG12BG will

bypass the control room hand switch and provide the permissive to open BBPV8702B. Valve EJHV8701B will remain closed since cables associated with this valve are not run through area C-22. Furthermore, BBPV8702B and EJHV8701B are administratively maintained closed with the breaker locked open. The 3-phase power cables associated with both valves are not run in this area, so a 3-phase hot short is not credible.

An open circuit in cable 14BBG12AF could prevent remote opening of valve BBPV8702A when transitioning to RHR Train A. If this occurs, a cold shutdown repair or a containment entry will be necessary to open the valve. Valve EJHV8701B can be controlled from the control room.

Valve EGHV0101 is the Train A CCW to RHR Heat Exchanger control valve. Valve EGHV0102 is the Train B CCW to RHR Heat Exchanger control valve. These valves are normally closed during power operation. PFSSD requires that the valve on the operating train of CCW be closed until shutdown cooling mode is entered, at which time the valve on the operating train of RHR needs to be open. Cables 14EGG07BC and 14EGG07BD are control cables associated with valve EGHV0102. Damage to either cable could cause the spurious opening of the valve and could prevent operation when lining up for shutdown cooling. Valve EGHV0101 is unaffected by a fire in this area.

When RHR pumps are operating, the associated mini-flow valve (EJFCV0610 or EJFCV0611) needs to be controlled. The mini-flow valves prevent RHR pump overheating by re-circulating water from the discharge side of the RHR heat exchanger to the suction side of the RHR pump. The mini-flow valve opens when the flow indicator measures low flow and closes on high flow. Damage to cable 14EJG08BC could prevent mini-flow valve EJFCV0611 from operating properly. If the Train B RHR pump spuriously starts and EJFCV0611 fails to operate, the pump could be damaged. This is a commercial concern only since Train A RHR pump and mini-flow valve EJFCV0610 are unaffected by a fire in this area.

The RHR heat exchanger discharge control valve on the operating train (EJHCV0606 (Train A) or EJHCV0607 (Train B)) needs to be available. Cable 16EJI12BA, which is associated with EJHCV0607, runs through area C-22. Cable 16RLY01DA provides 120 VAC power to RL017/RL018 (EJHY0607) from PN0833. Damage to these cables could result in the loss of control of valve EJHCV0607. Valve EJHCV0606 is unaffected by a fire in this area.

RHR pump A discharge to CVCS control valve EJHV8804A needs to be closed when operating the Train A RHR system. RHR pump B discharge to SI Pump B control valve EJHV8804B needs to be closed when operating the Train B RHR system. Damage to cable 14EJG04BC could cause valve EJHV8804B to spuriously open. Cables associated with EJHV8804A do not run in area C-22.

Cables associated with Train B RHR pump discharge to RCS cold leg isolation valve EJHV8809B run in area C-22. Damage to these cables could prevent operating the valve from the control room. Cables associated with Train A RHR pump discharge to RCS cold leg isolation valve EJHV8809A do not run in area C-22. Consequently, valve EJHV8809A is unaffected by a fire in area C-22.

The cold shutdown mode of PFSSD requires isolation of hot leg recirculation. Valve EJHV8840 is used to isolate RHR flow to the RCS hot leg loops 2 and 3. This valve is normally closed and is required to be closed for cold shutdown. During hot standby, the valve can be in any position. Cables associated with valve EJHV8840 run through area C-22. Damage to cables 14EJG09AC and 14EJG09AD would likely result in valve EJHV8840 remaining in its as-is normally closed position, which is the preferred PFSSD position. However, two proper intra-cable hot shorts in cable 14EJG09AD or one intra-cable hot short in cable 14EJG09AD combined with a short to ground on conductor U1 would spuriously open the valve.

As stated above, the position valve EJHV8840 (open or closed) will not affect hot standby. The valve needs to be closed for cold shutdown. The valve has been modified to address NRC IN

92-18 and can be closed manually prior to entering shutdown cooling mode. The torque and limit switches are not bypassed by postulated damage to these cables.

Based on the above discussion, the Train B RHR system could be affected by a fire in this area but the Train A RHR system is available. Valve EJHV8840 may need to be manually closed when transitioning to shutdown cooling mode of operation.

References: E-15000, XX-E-013, E-13BB12A, E-13BB12B, E-13EG07A, E-13EJ01, E-13EJ04B, E-13EJ08, E-13EJ09C, E-13EJ12, E-13RL01, E-13RL04, E-1F9205, E-1F9301, E-1F9401A, E-1F9421, M-12BB01, M-12EJ01

5.2.16 Pressurizer Power Operated Relief Valves and Associated Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed. Cables and components associated with PORV BBPCV0456A and associated block valve BBHV8000B are run through area C-22. Cables and components associated with PORV BBPCV0455A and associated block valve BBHV8000A are not located in area C-22.

The pressurizer PORVs are not considered high/low pressure interfaces. The valves are supplied power by an ungrounded 125 VDC system. Therefore, based on GL 86-10, consideration of multiple proper polarity hot shorts is not required. A single proper polarity hot short still needs to be considered. Damage to the BBPCV0456A control cables in this area could cause the spurious opening of the valve.

In the event a fire causes BBPCV0456A to open and damages BBHV8000B cables, Operators can close BBPCV0456A by placing hand switch BBHIS0456A, located on RL021, in the close position. Pressurizer level and RCS pressure indication are available to diagnose a failed open PORV using BBLI0459A and BBPI0405, respectively. In addition, pressurizer pressure indication is available using BBPI0455A and BBPI0457.

An instrument cable (14BBI16NB) associated with pressurizer pressure transmitter BBPT0458 is run in fire area C-22. Damage to this cable could send a spurious high-pressure signal to the pressure control system but will not open pressurizer PORVs BBPCV0455A or BBPCV0456A. As discussed in Calculation XX-E-013, Appendix 1, the Ovation pressurizer pressure control system uses 4-channel verification from all four pressurizer pressure transmitters to operate the pressurizer PORVs. Failure of a single channel will not cause the spurious operation of the PORVs since the system uses the 2nd highest input as the validated signal.

Cable 16SBS06BD provides output from panel RP047 to solid state protection cabinet SB032D to energize relay K713 on high pressure in the pressurizer. High pressurizer pressure will close the K713 contact (drawing E-13BB40) and open pressurizer PORV BBPCV0456A. Low pressure in the pressurizer will open the K750 contact (drawing E-13BB40) and close the PORV. Therefore, damage to this cable could cause the spurious opening of the PORV. If damage is limited to this cable, the PORV can be closed by placing BBHIS0456A in the close position.

The PFSSD function of cable 16SBS08FD is to provide BBPT0456 pressurizer pressure input signals from SB042 (Protection Set II) to Ovation NSSS control cabinet 6 (RP047). The PFSSD function of cable 16SBS08HC is to provide BBPT0458 pressurizer pressure input signals from SB041 (Protection Set IV) to Ovation NSSS control cabinet 6 (RP047). These cables carry a 0 to 10 VDC signal to the Ovation pressure control system. The operation of the Ovation pressure control system is described above and in Calculation XX-E-013. Due to the 4-channel validation logic of the Ovation controller, damage to these cables will not cause the spurious operation of the pressurizer PORVs, spray valves or heaters.

Based on the above discussion, pressurizer PORV BBPCV0456A could spuriously open due to damage to the PORV control cables or due to a spurious high pressurizer pressure signal and block valve BBHV8000B may not close due to cable damage. The PORV can be closed using hand switch BBHIS0456A in the main control room.

References: XX-E-013, E-15000, E-13BB16, E-13BB39, E-13BB40, E-13SB06, E-13SB08C, E-1F9201, E-1F9301, E-1F9421, J-200-00095, M-12BB02, M-744-00028, M-761-02048, M-761-02102, OFN KC-016, CR 13079, DCP 12944

5.2.17 Reactor Coolant System (RCS) Pressure Indication

The PFSSD design requires RCS pressure indication to be available to ensure operators have adequate diagnostic indication of RCS pressure.

RCS pressure indication is provided in the control room using pressure indicators BBPI0405 or BBPI0406. Cable 14BBI16BB is an instrument cable associated with BBPI0406 that runs from process protection cabinet SB148B to RL002. Damage to this cable could prevent RCS pressure indication on BBPI0406.

Redundant RCS pressure transmitter BBPT0405 and pressure indicator BBPI0405 are unaffected by a fire in area C-22. Therefore, RCS pressure indication is available using BBPI0405.

References: XX-E-013, E-15000, E-13BB16, E-1F9201, E-1F9205, M-12BB04

5.2.18 Reactor Head Vent Valves

PFSSD requires that one of the two reactor vessel head vent valves on each flow path (2 flow paths total) be closed to prevent uncontrolled depressurization of the RCS. Either BBHV8001A or BBHV8002A and either BBHV8001B or BBHV8002B needs to be closed.

A cable (14BBK30DA) associated with one of the four head vent valves (BBHV8002B) runs through area C-22. Cables for remaining head vent valves BBHV8001A, BBHV8002A and BBHV8001B are not run through C-22 and are unaffected by the fire. Therefore, at least one valve on each flow path can be controlled and spurious opening of BBHV8002B will have no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-13BB30, E-1F9301, M-12BB04

5.2.19 Centrifugal Charging Pumps

At least one centrifugal charging pump (CCP) is required for PFSSD to provide RCP seal cooling, reactivity control and inventory control. These functions are accomplished using a CCP taking suction from the refuelling water storage tank (RWST) and injecting through the RCP seals. RCP seal injection provides approximately 20 gpm makeup to the RCS and provides adequate boron concentration to maintain sub-critical reactivity conditions. If RCP seal injection is unavailable, reactivity and inventory control is provided by lining up the CCPs to the boron injection tank (BIT). The normal charging pump (NCP) is not credited and is assumed lost.

Control cables associated with Train B Centrifugal Charging Pump (CCP) PBG05B run through area C-22. Damage to these cables could prevent operation of the pump. Redundant Train A CCP cables are run in a separate fire area and are unaffected by a fire.

Control cables associated with Train B charging pump miniflow valve BGHV8111 run through area C-22. Redundant Train A cables for miniflow valve BGHV8110 are run in a different area and are unaffected by a fire in area C-22.

Cables associated with RWST to charging pump B control valve BNLCV0112E are run in this area. Damage to these cables could prevent opening or cause spurious closure of the valve. Redundant valve BNLCV0112D is unaffected by a fire in area C-22.

Based on the above discussion, the Train A CCP is available if a fire occurs in area C-22.

References: XX-E-013, E-15000, E-13BG01A, E-13BG11C, E-13BN01A, E-1F9102, E-1F9302, E-1F9401A, M-12BG03, M-12BN01

5.2.20 Charging Flow to Regenerative Heat Exchanger Isolation Valves

PFSSD requires charging flow to be directed to the RCS through the RCP seals. To ensure adequate flow to the RCP seals, flow diversion to the regenerative heat exchanger needs to be prevented. Valves BGHV8105 and BGHV8106 are included in the PFSSD equipment list to accomplish this task. Manual valve BG8402B is also included to provide an alternate means of closing this flow path during alternate safe shutdown using OFN RP-017.

A control cable associated with BGHV8105 is run in area C-22 and could be damaged by a fire, preventing valve BGHV8105 from being closed from the control room. Cables associated with valve BGHV8106, and its hand switch (BGHIS8106), are unaffected by a fire in area C-22. Therefore, valve BGHV8106 is available to isolate flow to the regenerative heat exchanger.

References: E-15000, XX-E-013, E-13BG11A, E-1F9102, E-1F9302, M-12BG03

5.2.21 Volume Control Tank (VCT) Discharge Valves

PFSSD requires isolation of the Volume Control Tank (VCT) discharge to charging pumps suction using either valve BGLCV0112B or BGLCV0112C. Cables associated with BGLCV0112C are run in area C-22. Damage to these cables could prevent closing this valve from the control room. Cables associated with BGLCV0112B are unaffected by a fire in this area.

Cable 14BGI51DA is an instrumentation cable for VCT level transmitter BGLT0185. Damage to this cable could send a false VCT low-low level signal and close relay K647 on the close circuit for valve BGLCV0112C. This would fail the valve closed if all other permissives are met, which is the desired PFSSD position. Therefore, damage to this cable will have no adverse impact on the ability to isolate the VCT discharge flow path.

Based on the above discussion, valve BGLCV0112B can be isolated using BGHIS0112B in the main control room.

References: E-15000, XX-E-013, E-13BG12A, E-13BG51, E-1F9102, E-1F9302, M-12BG03

5.2.22 Excess Letdown

The excess letdown flowpath is required to be isolated to prevent uncontrolled depressurization of the RCS. Therefore, either normally closed valve BGHV8153A or BGHV8154A must be maintained closed and either normally closed valve BGHV8153B or BGHV8154B must be maintained closed.

One cable associated with BGHV8154B runs through fire area C-22. Therefore, the remaining valves are unaffected by a fire in area C-22 and will remain closed.

References: E-15000, XX-E-013, E-1F9301, E-13BG48, M-12BG01

5.2.23 Steam Generator Blowdown to Blowdown Flash Tank Isolation Valves

The reactivity control function requires the steam generator blow down to blow down flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown. Cables associated with these valves are run in area C-22. An open circuit in these cables will fail the valves closed, which is the desired PFSSD position. A hot short on these cables could prevent the valves from being closed using hand switches BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A in the main control room.

Redundant means for closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 are available and are unaffected by a fire in area C-22. This redundant means uses BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C, located on the BM157 panel in the radwaste control room. Access is available without traversing area C-22.

Although the configuration is not in literal compliance with 10CFR50, Appendix R, feasible manual actions are available and are unaffected by the fire.

Thermal hydraulic analysis WCNOC-CP-002 shows insignificant impact on SG inventory even with all four blowdown valves open. Therefore, no E-1F9900 OMA is required to close blowdown valves to achieve and maintain hot standby. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 34.

References: E-15000, XX-E-013, E-13BM06A, E-1F9101, M-12BM01

5.2.24 Refueling Water Storage Tank (RWST) and Containment Sump Isolation Valves

To prevent drain down of the RWST into the containment sump, PFSSD requires that either valve BNHV8812A or valve EJHV8811A and valve BNHV8812B or valve EJHV8811B be closed during hot standby. For cold shutdown, the operating train containment sump valve (EJHV8811A or EJHV8811B) must be maintained closed to prevent flow diversion from the RCS to the containment sump. Valves BNHV8812A and BNHV8812B are normally open and valves EJHV8811A and EJHV8811B are normally closed.

Cable 14BNG03BC, associated with valve BNHV8812B, runs through area C-22. Damage to this cable could prevent closing this valve from the control room or could cause the valve to spuriously close. In addition, cable damage could prevent the valve from automatically closing when valve EJHV8811B reaches full open position.

A control cable (14EJG06BC) associated with valve EJHV8811B runs through fire area C-22. Damage to this cable will not result in valve EJHV8811B opening as long as valve BNHV8812B remains open. If valve BNHV8812B is fully closed, it will provide a permissive for valve EJHV8811B to open. If valve EJHV8811B opens due to damage to cable 14EJG06BC, drain down will not occur since valve BNHV8812B is closed.

Cable 14BNI07FA, associated with RWST level transmitter BNLT0933, is run in area C-22.
Cable 14SBS08AB, associated with RWST level indicator BNLI0931, is run in area C-22.
Cable 14SBS08DB, associated with RWST level indicator BNLI0933, is run in area C-22.
Circuits for the remaining RWST level transmitters and indicators are not run in area C-22.
Therefore, RWST level indication is available using level indicators BNLI0930 and BNLI0932.

Based on the above discussion, drain down of the RWST to the containment sump is not credible if a fire occurs in area C-22.

References: E-15000, XX-E-013, E-13BN03A, E-13EJ06B, E-13BN07, E-1F9102, E-1F9204, E-1F9205, M-12BN01, M-12EJ01, M-10BN, M-761-02039, M-761-02092

5.2.25 RCS Hot and Cold Leg Temperature Indication

PFSSD requires RCS hot and cold leg temperature indication on at least one loop to verify flow through the steam generators. The temperature elements and control room indicators used for this purpose are listed in the following table.

RCS Hot and Cold Leg Temperature Elements/Indicators Used for PFSSD		
ELEMENT	**INDICATOR**	**FUNCTION**
BBTE0413A	BBTI0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	BBTI0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	BBTR0423	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	BBTI0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	BBTR0433	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	BBTR0433	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	BBTR0443	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	BBTR0443	RCS Cold Leg Temperature Element (WR) Loop 4

Cable 14SBS08AC, associated with RCS temperature indicators BBTI0413B and BBTI0423B, is run in fire area C-22. A fire could damage this cable and cause temperature indication on the two temperature elements to be unavailable. Consequently, RCS loops 1 and 2 cold leg temperature indication could be lost.

Cable 16RLY01EA supplies 120 VAC power to control room panel RL021/RL022. At RL021/RL022, the power is split and supplies power to BBTR0433 and BBTR0443, as well as other non-PFSSD components. Damage to this cable could disrupt power to BBTR0433 and BBTR0443. Consequently, RCS loops 3 and 4 temperature indication could be lost.

Procedure EMG ES-04, Attachment B Section B1 provides alternate indication in the control room that may be used to verify natural circulation flow. One of these methods verifies that steam generator pressure is stable or decreasing. Based on Sections 5.2.1 and 5.2.2, cooldown is assured using loops 2 and 3, however SG B ARV could be affected. Based on Section 5.2.11, SG B pressure transmitters ABPT0524 and ABPT0526 and SG C pressure transmitters ABPT0534 and ABPT0536 are unaffected by a fire in C-22. These pressure transmitters, along with their respective indicators in the control room, can be used, per EMG ES-04, to verify heat removal in loops 2 and 3.

The configuration is acceptable because, in the event of a fire in area C-22, cooldown can be performed using RCS loops 2 and 3. RCS wide range hot leg temperature elements BBTE0413A and BBTE0423A as well as ABPT0524, ABPT0526, ABPT0534 and ABPT0536 will provide indication of flow through the steam generators.

References: E-15000, XX-E-013, E-13BB15, E-13RL01, E-13RL06, E-13SB08D, E-1F9201, E-1F9421, M-12BB01, M-761-00135, EMG-ES-04

5.2.26 Safety Injection (SI) Pumps

The preferred PFSSD condition of the SI pumps is off. Therefore, a spurious start of the SI pumps should be avoided or mitigated. A control cable (14EMB01BB) associated with the Train B SI pump PEM01B runs through area C-22 and could cause the spurious start of the pump and prevent stopping the pump from the control room.

If the Train B SI pump spuriously starts with the reactor at normal pressure, PFSSD will be assured. The pump will not discharge into the RCS due to the pressure differential between

the RCS (approximately 2,235 psig) and the SI pump shutoff pressure (approximately 1,565 psig). In addition, the set point of the discharge relief valve (EM8853B) to the Recycle Holdup Tank is 1,825 psig. Therefore, no inventory is lost from the RWST if the SI pumps spuriously start. With the SI pump operating with no flow, damage to the pump could occur, which is a commercial concern since the SI pump is not credited in the PFSSD analysis. If necessary, the pump can be stopped by opening breaker NB0202, but this action is not required for PFSSD.

Based on the above discussion, spurious operation of the Train B SI pump will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13EM01, E-1F9102, E-1F9302, M-12EM01, M-721-00096, WCRE-01

5.2.27 Boron Injection Tank Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

As discussed in Section 5.2.13, RCP seal injection is available in the event of a fire in area C-22. In addition, the letdown and excess letdown flowpaths can be isolated if a fire occurs in this area. Therefore, boration and inventory control through the BIT is not required to ensure PFSSD.

Cables associated with Train B BIT inlet valve EMHV8803B are run in this area. Damage to these cables could prevent opening the valve from the control room. Cables associated with Train B BIT outlet valve EMHV8801B and redundant Train A valves EMHV8803A and EMHV8801A are unaffected by a fire in this area. Therefore, BIT injection is available using the Train A CCP and valves EMHV8803A and EMHV8801A.

To prevent CCP flow diversion through the SIS test line when charging through the BIT, valves EMHV8843 and EMHV8882 need to be closed. If either or both of these valves cannot be closed, then closing or maintaining closed either valve EMHV8871 or EMHV8964 will prevent flow in the SIS test line. Cables associated with EMHV8843 and EMHV8871 are run in this area. Damage to these cables could cause the valves to open. Cables associated with EMHV8964 do not run in area C-22. Therefore, valve EMHV8964 can be controlled to prevent flow through the SIS test line when charging through the BIT.

Based on the above discussion, the BIT flowpath is available to provide a charging flowpath using the Train A CCP.

References: E-15000, XX-E-013, E-13EM02, E-13EM02A, E-13EM02B, E-13EM02C, E-13EM04, E-13EM04A, E-1F9302, M-12EM01, M-12EM02

5.2.28 Containment Spray (CS) Pumps

Spurious start of the CS pumps may complicate PFSSD due to the possible depletion of inventory in the RWST. Therefore, a spurious start of the CS pumps should be avoided or mitigated. A control cable (14ENB01BB) associated with Train B CS pump PEN01B runs through area C-22 and could cause a spurious start of the pump. The cable damage could prevent stopping the pump from the control room.

Normally closed valve ENHV0012 could open due to damage to associated control cables. If this occurs coincident with a running Train B CS pump, water would flow from the containment spray nozzles, depleting inventory in the RWST.

The total flow in the containment spray system during injection phase with one pump operating is 3,165 gpm (M-10EN). Based on calculation XX-E-013, Appendix 1, a maximum of 214,260 gallons of water can be lost from the RWST to maintain sufficient volume to achieve cold shutdown.

As stated previously, level indication in the RWST is available, so operators have the ability to diagnose a reducing RWST inventory. The time available to mitigate containment spray is:

214,260 gallons / 3,165 gpm = 67.7 minutes

Based on the above discussion, there is 67 minutes available to mitigate containment spray. This is an OMA. Refer to E-1F9900 for details. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 16.

References: XX-E-013, E-15000, E-13EN01, E-13EN03, E-1F9102, E-1F9302, E-1F9424B, E-1F9433, M-10EN, M-12EN01

5.2.29 Safety Injection Accumulator Isolation Valves

PFSSD requires isolation of the SI accumulators prior to reducing RCS pressure below the injection pressure to avoid unnecessary accumulator discharge. This is accomplished by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. These valves are normally open with the MCC breaker administratively locked in the open position. Cables for valves EPHV8808B and EPHV8808D are run in area C-22.

Since the breakers for these valves are normally open, damage to these cables will not cause the valves to spuriously change position. However, damage to the cables will prevent closing the associated valve from the control room after power is restored.

The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig. If necessary, a containment entry can be made to manually close the valves.

References: E-15000, XX-E-013, E-13EP02A, E-1F9201, M-12EP01, CKL EP-120

5.2.30 TDAFP Steam Trap Drain Valve

Valve FCFV0310 is an isolation valve on the 1-inch steam trap line associated with the TDAFP. Solenoid valve FCFY0310 controls the position of valve FCFV0310. PFSSD requires this valve to be closed to prevent uncontrolled loss of steam through this flow path.

Cable 14FCK21AA is a control cable associated with valve FCFV0310. Inter or intra-cable hot shorts could cause the valve to spuriously open. There are no energized 125 VDC cables in the same conduit as cable 14FCK21AA, so inter-cable hot shorts causing the valve to open are not possible. An intra-cable hot short from conductor 2 to conductor 1 will energize the solenoid and open the valve. This can be mitigated by depressing the close pushbutton on hand switch FCHIS0310. However, since this is a momentary contact switch, the operator would have to maintain the the button in the depressed position.

Uncontrolled blowdown through this 1-inch line is bounded by the main steam line break analysis and loss of steam through this line will not result in uncontrolled cooldown. Therefore, if the valve remains open, PFSSD is assured.

References: E-15000, XX-E-013, E-13FC21, E-1F9202, M-12FC02

5.2.31 Control Room Air Conditioning

Control room air conditioning is required to be available to satisfy the PFSSD support function. Two redundant and independent air conditioning units (SGK04A and SGK04B) are provided to satisfy this function. At least one unit is required to be available for PFSSD.

Cables 14GKG02BC, 14GKG02BD, 14GKG02BE and 14GKG02BF are control cables associated with control room A/C unit SGK04B. Damage to these cables due to a fire could prevent operation of Train B Control Room A/C unit.

Cable 14SAZ20EA is a control cable associated with status panel SA066B indication of Train B control room A/C dampers GKHZ0040A and GKHZ0040B. Cable 14SAZ20GA is a control cable that provides status panel SA066B indication of Train B control room A/C unit SGK04B. Damage to these cables could prevent operation of the associated components.

Cable 14SAZ20NA is a control cable associated with status panel SA066B indication of Train B control room A/C unit isolation hand switch GKHS0040 position. A short to ground on this cable would blow the control power fuse for SGK04B and prevent operation of the unit.

Cable 14GKY02BA, associated with control room A/C unit SGK04B supply and return dampers GKHZ0040A and GKHZ0040B, is run in this area. Damage to this cable could prevent operation of the dampers. Circuits for Train A control room A/C unit SGK04A do not run through area C-22 and are unaffected by a fire. Therefore, control room air conditioning is available using SGK04A. Status panel indication of Train A control room A/C components is unaffected.

References: XX-E-013, E-15000, E-13GK02C, E-13GK02D, E-13SA20, E-1F9442, M-12GK01, M-622.1A-00007

5.2.32 Class 1E Electrical Equipment Room Air Conditioning

The PFSSD support function requires Class 1E electrical equipment air conditioning on the operating train of equipment. Class 1E electrical equipment air conditioning is provided by units SGK05A (Train A) and SGK05B (Train B).

Cables associated with Train B Class 1E electrical equipment room A/C unit SGK05B are run in area C-22. Damage to these cables could prevent operation of the unit.

Cable 14SAZ20HA provides a control power signal from panel GK196C to status panel SA066B to monitor SGK05B control power. Damage to this cable could prevent operation of SGK05B.

Cable 14SAZ20PA is a control cable associated with status panel SA066B indication of Train B Class 1E A/C unit isolation hand switch GKHS0103 position. A short to ground on this cable would blow the control power fuse for SGK05B and prevent operation of the unit.

Cables associated with Train A Class 1E electrical equipment room A/C unit SGK05A are unaffected by a fire in this area. Therefore, room cooling for Train A Class 1E electrical equipment remains available.

References: XX-E-013, E-15000, E-13GK13A, E-13SA20, E-1F9444, M-12GK03, M-622.1A-00002

5.2.33 Standby Diesel Generation

Cables associated with the Train B diesel generator are run in this area. Also, cables associated with the Train B diesel generator room exhaust damper GMHZ0019 run in this area. Damage to these cables could prevent operation of the Train B diesel generator.

A fire in area C-22 could cause a loss of several Train B components, however, Train A components are available and are unaffected by the fire. Based on calculation XX-E-013, off-site power is available on Train A if a fire occurs in area C-22. Therefore, neither diesel generator is required if a fire occurs in this area and mal-operation of the Train B diesel generator will have no adverse impact on safe shutdown.

References: XX-E-013, E-15000, E-12KJ01, E-13GM01A, E-13GM04A, E-13JE01, E-13JE04, E-13KJ03A, E-13KJ07, E-13NE11, E-13NE13, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, E-1F9444, M-12GM01, M-12JE01

5.2.34 Containment Coolers

PFSSD requires containment cooling to maintain the containment environment within EQ limits. Cables associated with Train B containment coolers are run in area C-22. Damage to these cables could prevent operation of the Train B containment coolers. Circuits associated with Train A containment coolers are run in a separate fire area and are unaffected by a fire in area C-22.

As discussed earlier, Train A ESW is available if a fire occurs in area C-22. Therefore, the Train A containment coolers will have the necessary service water flow to ensure proper operation.

References: E-15000, XX-E-013, E-13GN02A, E-1F9441, M-12GN01

5.2.35 Class 1E 4.16 kV ESF Switchgear Bus NB01 and NB02

Bus NB02 supplies power to Train B Engineered Safety Features (ESF) components. A fire in area C-22 could damage cables associated with NB02, including cable 16NBA11AB which is associated with XNB02 feeder breaker PA0201 and disrupt power to all Train B ESF components.

Control cables associated with bus NB02 Synchro-scope and associated switches are run in area C-22. Damage to these cables could prevent some of the monitoring functions for NB02 but would not cause a loss of the NB02 bus.

Cable 16SY001 is associated with switch 1HSSY0018, which controls switchyard breaker 13-8. Damage to this cable could cause the breaker to open, causing a loss of one source of power to XNB01. Switchyard breaker 13-48 is unaffected by a fire in area C-22 and will remain available to provide off-site power to NB01.

Redundant Train A ESF components, supplied by NB01, are unaffected by a fire in area C-22. Therefore, loss of power to Train B components due to a fire in area C-22 will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-1000-SY00, E-1005-SY01, E-13NB04, E-13NB05, E-13NB06, E-13NB14, E-13NB15, E-13NB11, E-1F9423, E-1F9426, KD-7496

5.2.36 Train B 480 Volt Class 1E Load Centers

Cables associated with Train B 480 VAC Class 1E load centers NG02, NG04 and motor control center (MCC) NG06E are run in area C-22. In addition, as stated in other sections, loss of power to these load centers could occur due to loss of Train B off-site and on-site power. Therefore, Train B load centers and associated equipment may not be available if a fire occurs in this area.

Cable 14PKK11AA is associated with 480 VAC breaker NG0409. NG0409 supplies 480 VAC power to Train B 125 VDC battery charger PK22, which energizes the PK02 bus. Damage to this cable could disable power to the battery charger but will not de-energize PK02 due to the installed batteries. Battery set PK12 will maintain 125 VDC power to PK02. In addition, NG0102 is unaffected and will continue to supply power to Train A 125 VDC battery charger PK21.

Redundant Train A components, supplied by NG01, NG03 and NG05E are unaffected by a fire in area C-22. Therefore, loss of power to Train B 480 VAC Class 1E load centers NG02, NG04 and MCC NG06E will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11NG02, E-13NG10A, E-13NG11A, E-13NG11B, E-13PK11, E-K3NG10A, E-1F9411B, E-1F9412B, E-1F9422C, E-1F9423, E-1F9424A, E-1F9424B, E-1F9424C, E-1F9424D

5.2.37 Class 1E 125 VDC Distribution System

Power cables associated with the Class 1E 125 VDC electrical distribution system are run in area C-22. These cables supply 125 VDC power to various PFSSD loads. The cables and supplied PFSSD equipment are summarized in the following table.

CABLE	POWER SUPPLY	CONTROL PANEL	PFSSD COMPONENTS
14RLK01AA	NK04407	RL001/002	BGHV8153B, BGHV8154B
14RLK01BA	NK04409	RL005/006	FCFY0310
14RLK01CA	NK04412	RL017/018	EMHV8843, EMHV8871
14RLK01DA	NK04413	RL019/020	EGTV0030, GMHZ0019
14RLK01EA	NK04414	RL021/022	BBHV8001B, BBHV8002B
14RLK01FA	NK04411	RL023/024	BMHV0001, BMHV0002, BMHV0003, BMHV0004

Damage to these cables could cause a loss of power to the associated components. This is acceptable for PFSSD since the components fail in the desired PFSSD position upon loss of power, or the redundant Train A component is available to perform the PFSSD function.

References: XX-E-013, E-15000, E-13BB30, E-13BG48, E-13BM06A, E-13EG16, E-13EM04, E-13EM04A, E-13FC21, E-13GM04A, E-13RL01, E-13RL02, E-13RL03, E-13RL04, E-13RL05, E-13RL06, E-13RL07, E-1F9101, E-1F9202, E-1F9301, E-1F9302, E-1F9401A, E-1F9422B, E-1F9444, M-12BB04, M-12BG01, M-12BM01, M-12EG02, M-12EM01, M-12EM02, M-12FC02

5.2.38 Reactor Trip Switchgear

The reactor trip switchgear is required to ensure the ability to manually trip the reactor. The reactor is tripped using either hand switch SBHS0001 or SBHS0042 in the main control room. Each hand switch has contacts associated with Train A reactor trip switchgear SB102A and Train B reactor trip switchgear SB102B.

Cables 14SBS12BA and 14SBS12BC, associated with separation group 4 trip circuits, are run in area C-22. A hot short in these cables could cause a spurious reactor trip, which is the desired PFSSD condition. An open circuit will prevent a manual reactor trip on Train B reactor trip switchgear SB102B.

Cables associated with separation group 1 trip circuits are unaffected by a fire in area C-22. Therefore, operation of either hand switch SBHS0001 or SBHS0042 will cause a reactor trip on redundant Train A reactor trip switchgear SB102A.

References: XX-E-013, E-15000, E-13SB12A, E-1F9101

5.2.39 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B.

Cable 14SES07BC is an instrumentation cable associated with SR monitor signal processor SENY0061B. This cable runs from SENY0061B to the source range recorder on RL020. Damage to this cable could prevent operation of the recorder. Source Range monitoring remains available for a fire in area C-22 using SENE0031, SENE0032, SENY0060A/B and SENY0061A.

For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013, Attachment 3.

References: E-15000, XX-E-013, E-13SE07, E-1F9101

5.2.40 Steam Generator Feedwater Pumps

Main feedwater pump steam supply valves FCFV0005 and FCFV0105 are credited in the PFSSD analysis to trip the main feedwater pumps if the main steam isolation valves (MSIVs) are affected by a fire. Closing the MSIVs stops steam flow to the feedwater pumps' turbines and stops the feedwater pumps. The steam generator feedwater pumps are tripped in the event of a fire to prevent overfilling the steam generators.

Non-Class 1E 120 VAC Inverter PN10 and distribution panel PN10A provide power to FCFV0105 trip relays in panel FC170C. Cable 16FCQ29AE runs from control room hand switches FCHS0118A and FCHS0118B to panel FC170A. This cable provides the signal to close FCFV0105 when both hand switches are simultaneously depressed.

A fire in area C-22 could damage cable 16FCQ29AE. If this occurs, operators in the control room may not be able to close valve FCFV0105 to stop steam flow to steam generator feedwater pump PAE01B.

A fire in area C-22 will not affect the ability to close the MSIVs from the control room. All-close hand switch ABHS0080 is unaffected and can be used to close the MSIVs from the control room.

Based on the above discussion, valve FCFV0105 may not close if a fire occurs in this area. However, the MSIVs can be closed using hand switch ABHS0080 in the main control room. Therefore, the configuration is acceptable.

Cable 16AEB20AD is associated with motor driven feedwater pump PAE02. Damage to this cable could cause a spurious start of the associated pump or prevent the pump from stopping. As discussed in Section 5.2.12, the main feedwater isolation valves (MFIVs) can be isolated if a fire occurs in this area. With the MFIVs closed, spurious operation of pump PAE02 will have no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-13AE20, E-13FC29B, E-13FC35, E-13RP10, E-1F9103, E-1F9201, E-1F9421, M-12FC04

5.2.41 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs.

Three control cables associated with reactor coolant pumps C and D are run in fire area C-22. Damage to these cables in the event of a fire could prevent operators from stopping the C and D RCPs from the control room. However, a fire in C-22 will not cause a loss of all seal cooling since RCP seal injection and thermal barrier cooling remain available.

Based on the above discussion, the inability to trip the C and D RCPs from the control room will have no adverse impact on PFSSD. The pumps can continue to operate, providing forced flow circulation. If the pumps spuriously stop, natural circulation cooldown can be used.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1

5.2.42 Pressurizer Pressure and Level Indication

The PFSSD support function requires pressurizer pressure and level indication to be available. These indications are used to diagnose spurious actuations such as a failed open pressurizer PORV and failed open letdown valves causing a loss of RCS inventory.

Pressurizer pressure is provided by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458. Signals from these transmitters are indicated in the control room on pressure indicators BBPI0455A, BBPI0456, BBPI0457 and BBPI0458, respectively. As discussed in Section 5.2.8, a cable associated with BBPT0458 is run in fire area C-22. In addition, cable 16SBS08BA associated with BBPI0456 and cable 16SBS08DA associated with BBPI0458 are run in fire area C-22. Damage to these cables will prevent pressurizer pressure indication on these indicators. Cables associated with pressurizer pressure indicators BBPI0455A and BBPI0457 are unaffected by a fire in this area.

Pressurizer level is provided by level transmitters BBLT0459 and BBLT0460. Signals from these transmitters are indicated in the control room on level indicators BBLI0459A and BBLI0460A. Cable 14SBS08AA associated with BBLI0460A is run in area C-22. Damage to this cable could prevent pressurizer level indication on BBLI0460A. Cables associated with pressurizer level indicator BBLI0459A are unaffected by a fire in area C-22.

Based on the above discussion, pressurizer pressure and level indication is available using BBPI0455A, BBPI0457 and BBLI0459A if a fire occurs in this area.

References: E-15000, XX-E-013, E-13BB16, E-13SB08A, E-13SB08B, E-13SB08D, E-1F9301, J-200-00095, M-12BB02, M-761-00135, M-761-00139

5.2.43 Load Center Feeder Breakers PA0206 and PA0207 and Load Centers PG12 and PG20 Incoming Feeder Breakers PG1201 and PG2001

Load center feeder breakers PA0206, PA0207 PG1201 and PG2001 are credited for PFSSD because they supply power to credited non-safety related loads. Cables associated with these breakers run in this area. PFSSD impact due to damage to these cables is discussed below.

Cable 16PGA10CC is a control cable associated with breaker PA0206 and runs in fire area C-22. An intra-cable hot short in this cable will trip PA0206. Cable 16PGG13AA is a control cable associated with breaker PG1201 and runs in fire area C-22. Damage to this cable could trip PG1201. Breakers PA0206 and PG1201 supply power to the following PFSSD components:

- PG12KAF4 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0032
- PG12KAF5 – Main Steam Supply to Steam Seals Valve ABHV0046
- PG12KEF3 – Auxiliary Steam System Control Valve FBHV0080

PG12KAF4, PG12KAF5 and PG12KEF3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using hand switch ABHS0079. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Cable 16PGA11AB, associated with PA0207, runs in this area. A fire induced short circuit in this cable will trip the breaker. Cable 16PGG13DA, associated with PG2001, runs in this area. Damage to this cable will trip the breaker.

Breakers PA0207 and PG2001 supply power to the following PFSSD components:

- PG20GBR217 – MCB Misc. Power Circuits RL023
- PG20GER5 – Instr. Bus Transformer Alt. Feed XPN08D

PFSSD components powered from PG20GBR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG20GER5 is credited as one source of power to PN08. The redundant source of power from NG02BBF1 could also be affected by a fire in this area as discussed in Section 5.2.36. Redundant components powered from inverter PN07 are unaffected by a fire in this area.

Based on the above discussion, loss of breakers PA0206, PA0207, PG1201 and PG2001 will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-11PK02, E-13PG10, E-13PG11, E-13PG13, E-13RL07, E-1F9421, E-1F9422C, E-1F9424E, KD-7496, DCP 13324

5.2.44 Normal Pressurizer Spray

The normal pressurizer spray valves are included in the PFSSD design because spurious operation of pressurizer sprays can cause a decrease in pressure which can lead to boiling in the core. The pressurizer spray valves are part of the pressurizer pressure control system.

The pressurizer normal spray valves (BBPCV0455B and BBPCV0455C) operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

Instrument cables 14BBI16NB and 16SBS08HC associated with pressurizer pressure transmitter BBPT0458 are run in fire area C-22. Instrument cable 16SBS08FD associated with pressurizer pressure transmitter BBPT0456 is run in fire area C-22. Damage to these cables could send spurious high-pressure signals to the pressure control system. The operation of the Ovation pressure control system is described in Calculation XX-E-013. Due to the 4-channel validation logic of the Ovation controller, damage to these cables will not cause the spurious operation of the pressurizer PORVs, spray valves or heaters.

Based on the above discussion, the pressurizer spray valves will not spuriously open if a fire occurs in this area.

References: E-15000, XX-E-013, E-13BB19, E-13SB08C, M-744-00028, DCP 13324

FIRE AREA C-23

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-23 is located on the 2026 elevation of the Control Building and includes the rooms listed in Table C-23-1.

Table C-23-1
Rooms Located in Fire Area C-23

ROOM #	DESCRIPTION
3505	South Electrical Chase - 2026 Elevation

Fire area C-23 is protected by an automatic wet-pipe sprinkler system. In addition, automatic fire detection is installed throughout. The automatic suppression and detection system meets the requirements of 10CFR50, Appendix R, Section III.G.2.c.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-23-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-23-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-23

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Cables associated with S/G D ARV ABPV0004 may be damaged, preventing control of this valve from the control room. The ARV can be isolated by closing valves KAV1429 and KAV1365 to isolate air and nitrogen to the ARV. The capability to isolate the MSIVs and bypass valves using hand switch ABHS0079 may be affected. The MSIVs and bypass valves can be isolated using hand switch ABHS0080. Three main steam valves located downstream of the MSIVs could open. This will have no adverse impact on PFSSD since the MSIVs and bypass valves can be isolated.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-23.
AE	Main Feedwater	H, P	All PFSSD functions associated with the main feedwater system are satisfied. Steam generator (SG) level indication is available on SG B using wide range level transmitter AELT0502 and narrow range level transmitters AELT0528, AELT0529 and AELT0552. Steam generator level indication is available on SG C using wide range level transmitter AELT0503 and narrow range level transmitters AELT0538, AELT0539 and AELT0553. The capability to isolate the MFIVs using hand switch AEHS0081 may be affected. Isolate the MFIVs using hand switch AEHS0080.
AL	Aux. Feedwater System	H, P	Train B motor driven auxiliary feedwater pump (MDAFP) may be affected. The turbine driven auxiliary feedwater pump (TDAFP) is available to take suction from either the CST or the Train A ESW system and supply steam generators A, C and D. The Train A MDAFP is available to take suction from either the CST or the Train A ESW system and supply steam generators B and C. Steam generator D flow transmitter ALFT0001 may be affected. Steam generator A flow transmitter ALFT0007, steam generator B flow transmitter ALFT0009 and steam generator C flow transmitter ALFT0011 are unaffected.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-23.

Table C-23-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-23

System	System Name	PFSSD Function*	Comments
BB	Reactor Coolant System	R, M, H, P, S	All PFSSD functions associated with the reactor coolant system are satisfied. When transferring to RHR, valve BBPV8702A may need to be manually opened or a cold shutdown repair performed to provide a suction source from the RCS to RHR pump A. Pressurizer PORV BBPCV0456A may open and block valve BBHV8000B may not close. If this occurs, Operators can close the PORV by placing BBHIS0456A in the CLOSE position. RCS pressure indicator BBPI0406 may not function. RCS pressure indicator BBPI0405 is unaffected. Reactor vessel head vent valve BBHV8002B could spuriously open. The remaining head vent valves are unaffected and will remain closed to isolate the head vent flow path. RCS temperature recorders BBTR0433 and BBTR0443 on loops 3 and 4 could lose power. Temperature indication on loops 1 and 2 remains available. Pressurizer pressure transmitter BBPT0458 and indicator BBPI0458 could be affected. The remaining three pressurizer pressure transmitters and indicators are unaffected. Reactor coolant pumps C and D may not stop using the control room hand switch. RCP seal injection and thermal barrier cooling remain available. Therefore, the inability to stop the RCPs will have no adverse impact on PFSSD.
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. Train A Centrifugal Charging Pump (CCP) is available to provide charging flow from the RWST to the RCP seals and the BIT injection flowpath. Train B CCP miniflow valve BGHV8111 may be affected. Train A CCP miniflow valve BGHV8110 is unaffected. VCT isolation valve BGLCV0112C may be affected but redundant valve BGLCV0112B can be isolated using BGHIS0112B. CCP B to RCP seal injection valve BGHV8357B could be affected. Redundant Train A CCP to RCP seal injection valve BGHV8357A is unaffected. Excess letdown valve BGHV8154B could spuriously open. Redundant valve BGHV8153B is unaffected. RCP seal flow indication is available using BGFI0215A. RCP seal flow indicator BGFI0215B may be affected.
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blowdown system are satisfied. Steam generator blowdown is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C, located on the BM157 panel in the radwaste control room.

Table C-23-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-23

System	System Name	PFSSD Function*	Comments
BN	Borated Refueling Water Storage System	R, M, H	All PFSSD functions associated with the borated refueling water storage system are satisfied. The RWST is available to provide a suction source to Centrifugal Charging Pump A via valve BNLCV0112D. RWST level transmitter BNLT0933 may be affected. RWST level transmitters BNLT0930, BNLT0931 and BNLT0932 are unaffected.
EF	Essential Service Water System	H, S	All PFSSD functions associated with the Essential Service Water (ESW) system are satisfied. A number of components associated with Train B ESW may be affected. Train A ESW is available.
EG	Component Cooling Water System	S	All PFSSD functions associated with the Component Cooling Water (CCW) system are satisfied. Train B CCW may be affected. Train A CCW is available. CCW flow to the RCP thermal barrier could be temporarily disrupted due to closure of valve EGHV0062. Valve EGHV0132 can be opened from the control room to restore CCW flow to the thermal barriers. RCP seal injection is unaffected. CCW to RCP flow indicator EGFI0129 could be affected. CCW to RCP flow indicator EGFI0128 is unaffected. Valve EGHV0102 could be affected, preventing operation of Train B RHR. Valve EGHV0101 is unaffected.
EJ	Residual Heat Removal System	M, H, P	All PFSSD functions associated with Residual Heat Removal (RHR) system are satisfied. The Train B RHR pump may be affected but the Train A RHR pump is available. Loss of RCS inventory through the RHR flow path is prevented by maintaining valves EJHV8701A and EJHV8701B closed. Valve EJHV8701A can be opened from the control room when transitioning to RHR for cold shutdown. RHR pump B mini-flow valve EJFCV0611 is affected but RHR pump A mini-flow valve EJFCV0610 is available. RHR Train B to SI Pump B isolation valve EJHV8804B could spuriously open. RHR Train A to CVCS valve EJHV8804A is unaffected. Train B RHR pump discharge to RCS cold leg isolation valve EJHV8809B is affected. Train A RHR pump discharge to RCS cold leg isolation valve EJHV8809A is unaffected. Valve EJHV8840 could spuriously open in the event of a fire in this area. This will not affect hot standby, however the valve will need to be locally closed prior to entering shutdown cooling mode. RHR Train B flow control valve EJHCV0607 could be affected. RHR Train A flow control valve EJHCV0606 is unaffected.

Table C-23-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-23

System	System Name	PFSSD Function*	Comments
EM	High Pressure Coolant Injection	R, M	Train B safety injection pump PEM01B could spuriously start. Injection will not occur with the reactor at normal pressure. The pump can be stopped by opening breaker NB0202, but this action is not required for PFSSD. Since RCP seal injection is available, charging through the BIT is not required for hot standby. For cold shutdown, both BIT flowpaths are available. Prevent flow diversion through the SIS test line when charging through the BIT by maintaining valve EMHV8964 closed.
EN	Containment Spray	R, M	Containment spray pump PEN01B could spuriously start and valve ENHV0012 could open, causing containment spray. Pump PEN01B can be stopped by opening breaker NB0203 in area C-10. Containment spray pump PEN01A is unaffected.
EP	Safety Injection Accumulators	H	Accumulator injection lines can be isolated by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. It may be necessary to make a containment entry to manually close EPHV8808B and EPHV8808D prior to the RCS reaching 1000 psig.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-23.
FC	Auxiliary Turbines	R, H, P	Valve FCFV0105 may be affected. The MSIVs can be closed using all-close hand switch ABHS0080.
GD	ESW Pump House HVAC	S	The PFSSD function associated with ESW pump house HVAC is satisfied. The Train B ESW pump room ventilation system could be affected. The Train A ESW pump room ventilation system is unaffected.
GF	AFW Pump Room Coolers	S	The PFSSD function associated with the Auxiliary Feedwater Pump Room Coolers is satisfied. Train B motor driven auxiliary feedwater pump room cooler SGF02B may be affected. Train A motor driven auxiliary feedwater pump room cooler SGF02A is unaffected.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function associated with the Control Room and Class 1E Switchgear Room Coolers is satisfied. Train B control room A/C unit SGK04B may be affected. Train A control room A/C unit SGK04A is unaffected. Both Train A and Train B class 1E electrical equipment room A/C units (SGK05A and SGK05B) may be affected. If SGK05A spuriously shuts down or cannot be started, the spurious fire isolation signal can be bypassed by placing hand switch GKHS0101 in bypass position and the unit can be started using GKHIS0100. Hand switches GKHIS0100 and GKHS0101 are located on panel RP068 in the main control room.
GL	Auxiliary Building HVAC	S	The PFSSD function associated with the Auxiliary Building HVAC system is satisfied. Train B CCW pump room cooler SGL11B may be affected. Train A CCW pump room cooler SGL11A is unaffected.

Table C-23-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-23

System	System Name	PFSSD Function*	Comments
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function associated with the emergency diesel generator room HVAC system is satisfied. The Train B emergency diesel generator exhaust damper GMHZ0019 could be affected. The Train A diesel generator room HVAC system is unaffected.
GN	Containment Coolers	S	The PFSSD function associated with the containment coolers is satisfied. Train B containment coolers SGN01B and SGN01D could be affected. Train A containment coolers SGN01A and SGN01C are available.
JE	Diesel Fuel Oil	S	The PFSSD function associated with the Diesel Fuel Oil System is satisfied. The Train B emergency fuel oil transfer pump PJE01B may be affected. The Train A emergency fuel oil transfer pump PJE01A is unaffected. The Train B emergency diesel generator day tank level transmitter JELT0021 may be affected. The Train A day tank level transmitter is unaffected.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-23.
KC	Fire Protection	S	Cables associated with Halon protection in class 1E electrical equipment switchboard rooms 3408 and 3414 could be damaged by a fire in area C-23, causing Halon release in these rooms and subsequent shutdown of SGK05A. This will not adversely impact PFSSD (See GK discussion).
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-23.
KJ	Standby Diesel Engine	S	The PFSSD function associated with the Standby Diesel System is satisfied. The Train B diesel engine may be affected. The Train A diesel engine is unaffected.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-23.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-23.
NB	4.16 kV System	S	The PFSSD function associated with the class 1E 4.16 kV system is satisfied. A loss of off-site and on-site power to NB02 may occur. A loss of off-site power to NB01 may occur. On-site power to NB01 is unaffected.
NE	Standby Diesel Generator	S	The PFSSD function associated with the standby diesel generator system is satisfied. The Train B standby diesel generator could be affected. The Train A standby diesel generator is unaffected.

Table C-23-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-23

System	System Name	PFSSD Function*	Comments
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function associated with the load shed/emergency load sequencing system is satisfied. Cables associated with one of the four undervoltage (UV) relays and degraded voltage potential transformers on Trains A and B are run in fire area C-23. Emergency load shed/sequencer operates when 2/4 UV relays sense undervoltage on the bus. Therefore, automatic operation of the load shed/sequencer is unaffected.
NG	480V Load Centers and MCCs	S	The PFSSD function associated with the class 1E 480 volt load centers is satisfied. A loss of off-site and on-site power to Train B 480 VAC Class 1E load centers and MCCs could occur. A loss of off-site power to Train A 480 VAC Class 1E load centers and MCCs could occur. On-site power to Train A 480 VAC Class 1E load centers and MCCs is available.
NK	125VDC	S	Train B class 1E 125 VDC power could be disrupted to control room panels RL001/RL002, RL005/RL006, RL017/RL018, RL019/RL020, RL021/RL022 and RL023/RL024. Train A class 1E 125 VDC power is unaffected. The normal source of power to NK02 and NK04, through the Train B 480 V distribution system, could be disrupted due to loss of off-site and on-site power to Train B. 125 VDC battery sets NK012 and NK014 are unaffected. Train B class 1E 125 VDC power could be disrupted to RPS output panel SB032D. 125 VDC power is available to Train A RPS output panel SB029D.
NN	120VAC	S	The backup source of power to Train B Class 1E electrical distribution switchboards NN02 and NN04 could be affected due to loss of Train B on-site and off-site power to NB02. The normal source of power to NN02 and NN04 is unaffected due to the availability of 125 VDC battery sets NK012 and NK014. The normal and backup sources of power to Train A Class 1E electrical distribution switchboards NN01 and NN03 are unaffected.
PA	13.8kV	S	Breaker PA0207 could be affected by a fire in this area. Redundant capability is available.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-23.
PG	480V Load Centers and MCCs	S	Power from PG20GBR217 to RL023 could be affected, preventing closure of some components located downstream of the MSIVs. As discussed in the AB system summary, the MSIVs can be closed using ABHS0080 in the control room. Therefore, loss of power from PG20GBR217 to RL023 will have no adverse impact on PFSSD. Load Center PG20 could lose power. Redundant capability is available.
PK	125VDC	S	The PFSSD function associated with the non-class 1E 125 VDC system is satisfied. Battery charger PK22 may be affected. Battery set PK12 will maintain 125 VDC power to PK02. Also, Train A non-class 1E 125 VDC system is unaffected.

Table C-23-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-23

System	System Name	PFSSD Function*	Comments
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-23.
PN	120VAC	S	Power from PN0833 to RL017/RL018 may be affected. Power from PN0835 to RL021/RL022 may be affected. Power from PN0736 and PN0738 through Train A EDG and NG01B to RL017/RL018 and RL021/RL022 is unaffected.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-23.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-23.
RL	Control Room MCB	S	The PFSSD function associated with the control room panels is satisfied. Train B Class 1E 125 VDC power to RL001/RL002, RL005/RL006, RL017/RL018, RL019/RL020, RL021/RL022 and RL023/RL024 could be disrupted. The components either fail in the desired PFSSD position or the redundant Train A component is available. Train A Class 1E 125 VDC power is unaffected. Non class 1E (separation group 6) 120 VAC power to panels RL017/RL018, RL021/RL022 and RL023/RL024 could be affected. Non class 1E (separation group 5) 120 VAC power to panels RL017/RL018, RL021/RL022 and RL023/RL024 is unaffected.
RP	Miscellaneous Control Panels	R, M, H, P, S	Power to BOP instrument rack RP053B could be disrupted. BOP instrument racks RP053A, RP053D and RP147 are unaffected. Train B 120 VAC control power to panel RP068 could be affected. Train A 120 VAC control power to panel RP068 is unaffected. Control room lockout relays 86XRP5, 86XRP6 and 86XRP7 could be affected, preventing operation of Train B auxiliary feedwater. Train A auxiliary feedwater and the turbine driven auxiliary feedwater pumps remain available. Power to Group 2 Process Control Rack RP047 could be affected. This will not affect PFSSD as discussed in Section 5.2.12.
SA	ESFAS	S	125 VDC and 120 VAC power to panel SA036B could be lost, resulting in a loss of Channel 4 Engineered Safety Features Actuation System (ESFAS). ESFAS Channels 1 and 2 are unaffected. Status panel input for SGK05B could be affected. This will not adversely impact PFSSD.

Table C-23-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-23

System	System Name	PFSSD Function*	Comments
SB	Reactor Protection System	R, S	All PFSSD functions associated with the reactor protection system are satisfied. A loss of power to input channel 4 in SB029A and SB032A could occur. Input channels 1, 2 and 3 remain available. Train B output cabinet SB032D could lose power. Train A output cabinets are unaffected. Train B reactor trip switchgear SB102B could be affected. Train A reactor trip switchgear SB102A is unaffected. Channel 4 process protection panel SB041 could lose power. Process protection channels 1, 2 and 3 remain available. A number of process monitoring instruments at the ASP could be affected. Redundant process monitoring instruments in the main control room are unaffected.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-23.
SE	Ex-Core Neutron Monitoring	R, P	All PFSSD functions associated with the ex-core neutron monitoring system are satisfied. SR monitor signal processor SENY0061B and SR monitor amplifier SENY0061A could be affected. Source range monitoring remains available using SENE0031, SENE0032 and SENY0060A/B
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-23.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-23.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-23. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator Atmospheric Relief Valves

Cables associated with S/G ARV ABPV0004 may be damaged, preventing control of this valve from the control room. The ARV can be isolated by closing valve KAV1429 and nitrogen is isolated by closing valve KAV1365. The air and nitrogen supply valves are located in fire area A-23 and access is available without having to traverse area C-23.

3.1.2 Steam Generator Blowdown Isolation

Blowdown may not be isolable using BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A. Therefore, it may be necessary to isolate blowdown using BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C located on BM157 in the Radwaste Control room.

3.1.3 **Containment Spray Pump** (OMA, refer to E-1F9900)

Containment spray pump PEN01B could spuriously start and valve ENHV0012 could open, causing containment spray. The pump can be stopped by opening breaker NB0203 in area C-10. Access is available without traversing area C-23 and emergency lighting is provided. Operators have 67 minutes to mitigate containment spray.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Main Steam Isolation Valves and MSIV Bypass Valves

The capability to isolate the MSIVs and bypass valves using hand switch ABHS0079 may be affected. The MSIVs and bypass valves can be isolated using hand switch ABHS0080.

3.2.2 Main Feedwater Isolation Valves

The capability to isolate the MFIVs using hand switch AEHS0081 may be affected. Isolate the MFIVs using hand switch AEHS0080.

3.2.3 Volume Control Tank

Valve BGLCV0112C may not close in response to a signal from the control room. Redundant valve BGLCV0112B can be isolated using BGHIS0112B on RL001.

3.2.4 Class 1E A/C Unit SGK05A

Class 1E electrical equipment room A/C unit SGK05A may be affected due to damage to cables associated with the fire detection system. If SGK05A spuriously shuts down or cannot

be started, the spurious fire isolation signal can be bypassed by placing hand switch GKHS0101 in bypass position and the unit can be started using GKHIS0100. Hand switches GKHIS0100 and GKHS0101 are located on panel RP068 in the main control room.

3.2.5 Component Cooling Water

Train B CCW could be affected by a fire in this area. If this occurs, swap to Train A CCW using normal operating procedures if Train A CCW is not already running.

3.2.6 Reactor Coolant Pump Seal Injection

The normal charging pump is not analyzed and is assumed lost. To ensure an uninterrupted seal injection flow, operators should start Train A CCP and open BGHV8357A using BGHIS8357B. RCP seal flow indication is available using BGFI0215A.

3.2.7 Thermal Barrier Cooling

CCW flow to the thermal barrier cooling coils could be interrupted due to the spurious closure of valve EGHV0062. If this occurs, operators should open bypass valve EGHV0132 using EGHIS0132 to restore thermal barrier cooling. CCW to RCP flow indicator EGFI0128 is unaffected and can be used to diagnose a loss of thermal barrier cooling.

3.2.8 Pressurizer PORV/Block Valve

Pressurizer PORV BBPCV0456A could spuriously open and block valve BBHV8000B may not close. If this occurs, Operators can close the PORV by placing BBHIS0456A in the CLOSE position. Pressurizer pressure indication is available using BBPI0455A, BBPI0456 and BBPI0457 located on RL002.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR

A number of Train B RHR components, including the Train B RHR pump, may be affected by a fire in this area. Use Train A RHR for shutdown cooling. Valve BBPV8702A may need to be manually opened, or a cold shutdown repair performed, when aligning Train A RHR.

Valve EJHV8840 could spuriously open in the event of a fire in this area. This will not affect hot standby, however the valve will need to be locally closed prior to entering shutdown cooling mode.

3.3.2 Safety Injection Accumulators

It may be necessary to make a containment entry to close SI Accumulator injection valves EPHV8808B and EPHV8808D if these valves are unresponsive from the control room. Otherwise, nitrogen pressure can be relieved from the tanks to prevent injection. Valves EPHV8808A and EPHV8808C are unaffected.

4.0 CONCLUSION

With some exceptions, redundant Post Fire Safe Shutdown capability exists if a severe fire occurs in area C-23. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-23.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-23

There are no PFSSD components located in area C-23. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-23-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-23. The applicable evaluation section is also listed in Table C-23-3.

Table C-23-3
PFSSD Cables Located in Fire Area C-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ABI20HE	3505	ABPY0004	I	5.2.1	SG D Atmospheric Relief Valve I/P Converter
14ABI20HG	3505	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HH	3505	ABPV0004	I	5.2.1	SG D Steamline Pressure (ABPT0004)
14ABI20HJ	3505	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HK	3505	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HL	3505	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HM	3505	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HN	3505	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABK23FA	3505	ABHY0012B	C	5.2.4	ABHV0012 Solenoid Valve
14ABK23FB	3505	ABHY0015B	C	5.2.4	ABHV0015 Solenoid Valve
14ABK23FC	3505	ABHY0018B	C	5.2.4	ABHV0018 Solenoid Valve
14ABK23FD	3505	ABHY0021B	C	5.2.4	ABHV0021 Solenoid Valve
14ABK23FE	3505	ABHV0012, ABHV0015, ABHV0018, ABHV0021	C	5.2.4	MSIV Bypass Valves
14ABK23FF	3505	ABHV0012, ABHV0015, ABHV0018, ABHV0021	C	5.2.4	MSIV Bypass Valves
14ABK23FG	3505	ABHV0012, ABHV0015 ABHV0018, ABHV0021	C	5.2.4	Main Steam Isolation Valve ABHV0011, 14, 17, 20 Bypass Valve
14ABK30BB	3505	SA075B	P	5.2.5 5.2.7	125 VDC to MSFIS Cabinet SA075B from NK5423
14AEI08LB	3505	AELT0504	I	5.2.6	SG D Wide Range Water Level
14AEI08NB	3505	AELT0517	I	5.2.6	SG A Narrow Range Level Transmitter
14AEI08PB	3505	AELT0527	I	5.2.6	SG B Narrow Range Level Transmitter
14AEI08QB	3505	AELT0537	I	5.2.6	SG C Narrow Range Level Transmitter

Table C-23-3
PFSSD Cables Located in Fire Area C-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14AEI08RB	3505	AELT0547	I	5.2.6	SG D Narrow Range Level Transmitter
14ALB01B2	3505	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALB01BG	3505	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALB01BM	3505	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALG02AF	3505	ALHV0034	C	5.2.8	Cond Storage Tank To MDAFW Pump B
14ALG02AG	3505	ALHV0034	C	5.2.8	Cond Storage Tank To MDAFW Pump B
14ALG02AH	3505	ALHV0034	C	5.2.8	Cond Storage Tank To MDAFW Pump B
14ALG02AK	3505	ALHV0034	C	5.2.8	Cond Storage Tank To MDAFW Pump B
14ALG04AF	3505	ALHV0030	C	5.2.8	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04AG	3505	ALHV0030	C	5.2.8	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04AH	3505	ALHV0030	C	5.2.8	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04AK	3505	ALHV0030	C	5.2.8	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04DF	3505	ALHV0033	C	5.2.8	Train B ESW to TDAFP
14ALG04DG	3505	ALHV0033	C	5.2.8	Train B ESW to TDAFP
14ALG04DH	3505	ALHV0033	C	5.2.8	Train B ESW to TDAFP
14ALG04DK	3505	ALHV0033	C	5.2.8	Train B ESW to TDAFP
14ALI03AG	3505	ALHV0005	I	5.2.8	MDAFP B to SG D
14ALI03AH	3505	ALHV0005	I	5.2.8	MDAFP B to SG D
14ALI03AJ	3505	ALHV0005	I	5.2.8	MDAFP B to SG D
14ALI03AK	3505	ALHV0005	I	5.2.8	MDAFP B to SG D
14ALI03AL	3505	ALHV0005	I	5.2.8	MDAFP B to SG D
14ALI03AM	3505	ALHV0005	I	5.2.8	MDAFP B to SG D
14ALI03AP	3505	ALHV0005	I	5.2.8	MDAFP B to SG D

Table C-23-3
PFSSD Cables Located in Fire Area C-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALI05AG	3505	ALHV0010	I	5.2.8	TDAFP to SG B
14ALI05AH	3505	ALHV0010	I	5.2.8	TDAFP to SG B
14ALI05AJ	3505	ALHV0010	I	5.2.8	TDAFP to SG B
14ALI05AK	3505	ALHV0010	I	5.2.8	TDAFP to SG B
14ALI05AM	3505	ALHV0010	I	5.2.8	TDAFP to SG B
14ALI05AN	3505	ALHV0010	I	5.2.8	TDAFP to SG B
14ALI05AQ	3505	ALHV0010	I	5.2.8	TDAFP to SG B
14ALI07AD	3505	ALFT0001	I	5.2.8	Aux Feedwater to SG D Flow
14ALI07AE	3505	ALFT0001	I	5.2.8	Aux Feedwater to SG D Flow
14ALI07HD	3505	ALPT0024	I	5.2.8	MDAFP B Suction Pressure
14ALI07HE	3505	ALPT0024	I	5.2.8	MDAFP B Suction Pressure
14ALI07HF	3505	ALPT0024	I	5.2.8	MDAFP B Suction Pressure
14ALY09AD	3505	ALHV0005	C	5.2.8	MDAFP B to SG D
14BBG04AA	3505	BBHV8351A	P	5.2.9	RCP A Seal Water Supply
14BBG04AB	3505	BBHV8351A	C	5.2.9	RCP A Seal Water Supply
14BBG04BA	3505	BBHV8351B	P	5.2.9	RCP B Seal Water Supply
14BBG04BB	3505	BBHV8351B	C	5.2.9	RCP B Seal Water Supply
14BBG04CA	3505	BBHV8351C	P	5.2.9	RCP C Seal Water Supply
14BBG04CB	3505	BBHV8351C	C	5.2.9	RCP C Seal Water Supply
14BBG04DA	3505	BBHV8351D	P	5.2.9	RCP D Seal Water Supply
14BBG04DB	3505	BBHV8351D	C	5.2.9	RCP D Seal Water Supply
14BBG12AF	3505	BBPV8702A	C	5.2.11	RCS Hot Leg 1 to RHR Pump A Suction
14BBG12AG	3505	BBPV8702A	C	5.2.11	RCS Hot Leg 1 to RHR Pump A Suction

Table C-23-3
PFSSD Cables Located in Fire Area C-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BBG12BF	3505	BBPV8702B	C	5.2.11	RCS Hot Leg 4 to RHR Pump B Suction
14BBG12BG	3505	BBPV8702B	C	5.2.11	RCS Hot Leg 4 to RHR Pump B Suction
14BBG39BC	3505	BBHV8000B	C	5.2.12	Pressurizer PORV BBPCV0456A Block Valve
14BBG39BF	3505	BBHV8000B	C	5.2.12	PZR Power Relief PCV-456A Inlet Isolation
14BBG39BJ	3505	BBHV8000B	C	5.2.12	PZR Power Relief PCV-456A Inlet Isolation
14BBI16BA	3505	BBPT0406	I	5.2.13	RCS Hot Leg Wide Range Pressure
14BBI16BB	3505	BBPT0406	I	5.2.13	RCS Hot Leg Wide Range Pressure
14BBI16NB	3505	BBPT0458	I	5.2.2 5.2.12 5.2.45	Pressurizer Pressure Transmitter
14BBK30DA	3505	BBHV8002B	C	5.2.14	RX Vessel Head Vent Valve
14BBK40BK	3505	BBPCV0456A	C	5.2.12	Pressurizer Power Operated Relief Valve
14BBK40BL	3505	BBPCV0456A	P	5.2.12	Pressurizer Power Operated Relief Valve
14BBK40BM	3505	BBPCV0456A	C	5.2.12	Pressurizer Power Operated Relief Valve
14BBK40BN	3505	BBPCV0456A	P	5.2.12	Pressurizer Power Operated Relief Valve
14BGB01BB	3505	DPBG05B	C	5.2.15	Train B Centrifugal Charging Pump Motor
14BGG11DC	3505	BGHV8111	C	5.2.15	CCP B Miniflow Valve
14BGG11DD	3505	BGHV8111	C	5.2.15	CCP B Miniflow Valve
14BGG12BA	3505	BGLCV0112C	P	5.2.17	VCT Outlet Valve
14BGG12BB	3505	BGLCV0112C	C	5.2.17	VCT Outlet Valve
14BGG12BC	3505	BGLCV0112C	C	5.2.17	VCT Outlet Valve
14BGG12BE	3505	BGLCV0112C	C	5.2.17	BNLCV112E Interlock
14BGG52BC	3505	BGHV8357B	C	5.2.9	CCP B Discharge to RCP Seals

Table C-23-3
PFSSD Cables Located in Fire Area C-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BGI51BA	3505	BGFT0215B	I	5.2.9	RCP Seal Total Flow Transmitter
14BGK48BB	3505	BGHV8154B	C	5.2.18	Excess Letdown Isolation Valve
14BMK06AC	3505	BMHV0001	C	5.2.19	SG A Blowdown to Flash Tank
14BMK06BC	3505	BMHV0002	C	5.2.19	SG B Blowdown to Flash Tank
14BMK06CC	3505	BMHV0003	C	5.2.19	SG C Blowdown to Flash Tank
14BMK06DC	3505	BMHV0004	C	5.2.19	SG D Blowdown to Flash Tank
14BNG01BC	3505	BNLCV0112E	C	5.2.15	Charging Pump B Suction from RWST
14BNG01BD	3505	BNLCV0112E	C	5.2.15	Charging Pump B Suction from RWST
14BNG03BC	3505	BNHV8812B	C	5.2.20	RWST To RHR Pump B Suction
14BNI07FA	3505	BNLT0933	I	5.2.20	Refueling Water Storage Tank Level
14EFB01SA	3505	DPEF01B	C	5.2.21	Train B ESW Pump Motor
14EFB01SB	3505	DPEF01B	C	5.2.21	Train B ESW Pump Motor
14EFG02CC	3505	EFHV0025	C	5.2.21	Service Water to Train A ESW Cross Connect
14EFG02CD	3505	EFHV0025	C	5.2.21	Service Water to Train A ESW Cross Connect
14EFG02CE	3505	EFHV0025	C	5.2.21	Service Water to Train A ESW Cross Connect
14EFG02CF	3505	EFHV0025	C	5.2.21	Service Water to Train A ESW Cross Connect
14EFG02DC	3505	EFHV0026	C	5.2.21	Service Water to Train B ESW Cross Connect
14EFG02DD	3505	EFHV0026	C	5.2.21	Service Water to Train B ESW Cross Connect
14EFG02DE	3505	EFHV0026	C	5.2.21	Service Water to Train B ESW Cross Connect
14EFG02DF	3505	EFHV0026	C	5.2.21	Service Water to Train B ESW Cross Connect
14EFG03AC	3505	EFHV0039	C	5.2.21	ESW A to Service Water Cross Connect Valve
14EFG03AD	3505	EFHV0039	C	5.2.21	ESW A to Service Water Cross Connect Valve
14EFG03AE	3505	EFHV0039	C	5.2.21	ESW A to Service Water Cross Connect Valve

Table C-23-3
PFSSD Cables Located in Fire Area C-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EFG03BC	3505	EFHV0040	C	5.2.21	ESW B to Service Water Cross Connect Valve
14EFG03BD	3505	EFHV0040	C	5.2.21	ESW B to Service Water Cross Connect Valve
14EFG03BE	3505	EFHV0040	C	5.2.21	ESW B to Service Water Cross Connect Valve
14EFG06BC	3505	EFHV0038	C	5.2.21	ESW B To Ultimate Heat Sink
14EFG07BC	3505	EFHV0032	C	5.2.21	Train B ESW to Containment Air Coolers
14EFG08BC	3505	EFHV0050	C	5.2.21	Train B ESW from Containment Air Coolers
14EFG09BC	3505	EFHV0034	C	5.2.21	Train B ESW to Containment Air Coolers
14EFG09DC	3505	EFHV0046	C	5.2.21	Train B ESW from Containment Air Coolers
14EFI08RB	3505	EFPT0002	I	5.2.21	Train B ESW Pump Discharge Pressure
14EFI11FA	3505	EFFT0054	I	5.2.21	Train B ESW Flow Transmitter
14EGB01BB	3505	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BC	3505	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BD	3505	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BG	3505	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BK	3505	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01DB	3505	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGB01DC	3505	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGB01DD	3505	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGB01DG	3505	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGG05DD	3505	EGHV0054	C	5.2.10	CCW B to Common Header
14EGG07BA	3505	EGHV0102	P	5.2.11	CCW to RHR HX B Isolation
14EGG07BB	3505	EGHV0102	C	5.2.11	CCW to RHR HX B Isolation
14EGG10AC	3505	EGHV0062	C	5.2.10	CCW Return from RCP Thermal Barrier

Table C-23-3
PFSSD Cables Located in Fire Area C-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EGG10AD	3505	EGHV0062	C	5.2.10	CCW Return from RCP Thermal Barrier
14EGG18BC	3505	EGHV0127	C	5.2.10	CCW Containment Isolation Bypass Valve
14EGG18BD	3505	EGHV0127	C	5.2.10	CCW Containment Isolation Bypass Valve
14EGG18DC	3505	EGHV0133	C	5.2.10	EGHV0061 Bypass Valve
14EGG18DD	3505	EGHV0133	C	5.2.10	EGHV0061 Bypass Valve
14EGI13BA	3505	EGPT0078	I	5.2.10	CCW Pumps B and D Discharge Pressure
14EGK16BA	3505	EGTV0030	C	5.2.10	CCW B HX Bypass Valve
14EJB01BB	3505	DPEJ01B	C	5.2.11	RHR Pump B Motor
14EJG04BC	3505	EJHV8804B	C	5.2.11	RHR B Supply To SI Pump B Iso Valve
14EJG06BC	3505	EJHV8811B	C	5.2.20	Containment Recirc Sump Iso Valve
14EJG08BC	3505	EJFCV0611	C	5.2.11	RHR Pump B Miniflow Valve
14EJG09AC	3505	EJHV8840	C	5.2.11	RHR to RCS Hot Leg Loops 2 and 3
14EJG09AD	3505	EJHV8840	C	5.2.11	RHR to RCS Hot Leg Loops 2 and 3
14EJG09BC	3505	EJHV8809B	C	5.2.11	RHR to RCS Cold Leg Loops 3 & 4
14EJG09BD	3505	EJHV8809B	C	5.2.11	RHR to RCS Cold Leg Loops 3 & 4
14EMB01BB	3505	DPEM01B	C	5.2.22	Train B Safety Injection Pump Motor
14EMK04CA	3505	EMHV8843	C	5.2.23	Boron Injection Upstream Test Line
14EMK04EA	3505	EMHV8871	C	5.2.23	SI Test Line from BIT
14ENB01BB	3505	DPEN01B	C	5.2.24	Containment Spray Pump B Motor
14ENG03BC	3505	ENHV0012	C	5.2.24	Containment Spray Pump B Isolation Valve
14ENG03BD	3505	ENHV0012	C	5.2.24	Containment Spray Pump B Isolation Valve
14EPG02CE	3505	EPHV8808B	C	5.2.25	Accumulator Tank B Outlet Iso Valve
14EPG02DE	3505	EPHV8808D	C	5.2.25	Accumulator Tank D Outlet Iso Valve

Table C-23-3
PFSSD Cables Located in Fire Area C-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GDG01BF	3505	DCGD01B	C	5.2.21	ESW Pump Room Supply Fan B Motor (GDHS0011)
14GDY01BA	3505	CGD01B	C	5.2.21	Train B ESW Pump Room Supply Fan
14GDY01BB	3505	CGD01B	C	5.2.21	Train B ESW Pump Room Supply Fan
14GDY01BD	3505	CGD01B	C	5.2.21	ESW Pump Room B Supply Fan
14GFG01BC	3505	DSGF02B	C	5.2.8	AFW Pump B Room Cooler Motor
14GKG02BA	3505	SGK04B	P	5.2.27	Control Room A/C Unit B
14GKG13BG	3505	SGK05B	C	5.2.28	Class 1E Elec. Equip. Room A/C Unit B
14GKG13BK	3505	SGK05B	C	5.2.28	Class 1E Elec. Equip. Room A/C Unit B (GKHS0103)
14GKG13BM	3505	SGK05B	C	5.2.28	Class 1E Elec. Equip. Room A/C Unit B (GKHS0103)
14GKY02BA	3505	GKHZ0040A/B	C	5.2.27	Control Room A/C Unit 4B Supply/Discharge Dampers
14GKY02BB	3505	GKHZ0040B	C	5.2.27	Control Room A/C Unit 4B Discharge Damper
14GKY02BC	3505	GKHZ0040A	C	5.2.27	Control Room A/C Unit 4B Supply Damper
14GKY02BD	3505	GKHZ0040A/B	C	5.2.27	Control Room A/C Unit 4B Supply/Discharge Dampers
14GKY02BE	3505	GKHZ0040A/B	P	5.2.27	Control Room A/C Unit 4B Supply/Discharge Dampers
14GKY02BF	3505	GKHZ0040A/B	P	5.2.27	Control Room A/C Unit 4B Supply/Discharge Dampers
14GLG06BA	3505	DSGL11B	P	5.2.10	CCW Pump B Room Cooling Fan Motor
14GLG06BC	3505	DSGL11B	C	5.2.10	CCW Pump B Room Cooling Fan Motor (GLHIS0023)
14GLG06BD	3505	DSGL11B	C	5.2.10	CCW Pump B Room Cooling Fan Motor

Table C-23-3
PFSSD Cables Located in Fire Area C-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GMG01BH	3505	GMHS0011B	C	5.2.29	Train B Diesel Generator Room Supply Fan Isolation Switch
14GMK04BA	3505	GMHZ0019	C	5.2.29	Train B DG Room Exhaust Damper
14GMK04BB	3505	GMHZ0019	C	5.2.29	Train B DG Room Exhaust Damper
14GMK04BE	3505	GMHZ0019	C	5.2.29	Train B DG Room Exhaust Damper
14GNG02BD	3505	DSGN01B	C	5.2.30	Containment Cooler B Motor
14GNG02BH	3505	DSGN01B	C	5.2.30	Containment Cooler B Motor
14GNG02DD	3505	DSGN01D	C	5.2.30	Containment Cooler D Motor
14GNG02DH	3505	DSGN01D	C	5.2.30	Containment Cooler D Motor
14JEG01BB	3505	DPJE01B	C	5.2.29	Train B Emergency Fuel Oil Transfer Pump Motor
14JEG01BD	3505	DPJE01B	C	5.2.29	Emergency Fuel Oil Transfer Pump B Motor
14JEG01BE	3505	DPJE01B	C	5.2.29	Train B Emergency Fuel Oil Transfer Pump Motor
14JEI04BA	3505	JELT0021	I	5.2.29	Train B Emergency Fuel Oil Day Tank Level
14KJK03AH	3505	KKJ01B	C	5.2.29	Train B EDG
14KJK03AJ	3418	KKJ01B	C	5.2.29	Train B EDG
14KJK03AK	3505	KKJ01B	C	5.2.29	Train B EDG
14KJK07AE	3505	NE106	P	5.2.29	Train B EDG Control Panel
14NBB04AB	3505	NBHS0011	C	5.2.31	NB02 Synchro-scope/Selector Switch
14NBB04AD	3505	NBHS0011	C	5.2.31	NB02 Synchro-scope/Selector Switch
14NBB04AE	3505	NBHS0011	C	5.2.31	NB02 Synchro-scope/Selector Switch
14NBB04AF	3505	NBHS0011	C	5.2.31	NB02 Synchro-scope/Selector Switch
14NBB05AC	3505	NBHS0008	C	5.2.31	XNB02 to NB0209 Synch Transfer Switch

Table C-23-3
PFSSD Cables Located in Fire Area C-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NBB06AC	3505	NBHS0009	C	5.2.31	XNB01 to NB0212 Synch Transfer Switch
14NBB14AA	3505	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AB	3505	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AC	3505	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AD	3505	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AE	3505	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AF	3505	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AG	3505	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB15AA	3505	NB00212	C	5.2.31	Bus NB02 Feeder Breaker NB0212 Control
14NBB15AC	3505	NB00212	C	5.2.31	Bus NB02 Feeder Breaker NB0212 Control
14NEB02AL	3505	NE106	C	5.2.29	Train B Diesel Generator Control Panel
14NEB11AA	3505	NB00211	C	5.2.29	Train B D/G Feeder Breaker NB0211 Control
14NEB11AD	3505	NB00211	C	5.2.29	Train B D/G Feeder Breaker NB0211 Control
14NEK13AD	3505	NE106	C	5.2.29	Train B D/G Control Panel
14NEK13AJ	3505	NE106	I	5.2.29	Train B D/G Control Panel
14NFK01AA	3505	NF039C	P	5.2.32	Load Shed / Sequencer Ch 1 & 4 Terms
14NFK01CA	3505	NF039A	C	5.2.32	Load Shed / Sequencer Ch 1 Logic
14NFK01DA	3505	NF039B	C	5.2.32	Load Shed / Sequencer Ch 4 Logic
14NFY01EA	3505	NF039A	C	5.2.32	Load Shed / Sequencer Ch 1 Logic
14NFY01FA	3505	NF039B	C	5.2.32	Load Shed / Sequencer Ch 4 Logic
14NFY01GA	3505	NF039A	P	5.2.32	Load Shed / Sequencer Ch 1 Logic
14NFY01HA	3505	NF039B	P	5.2.32	Load Shed / Sequencer Ch 4 Logic
14NGB10AB	3505	NB00213	C	5.2.33	Breaker NB0213 to XNG02 Control

Table C-23-3
PFSSD Cables Located in Fire Area C-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NGB10BB	3505	NB00210	C	5.2.33	Breaker NB0210 to XNG04 Control
14NGB10SA	3505	NB00216	C	5.2.33	Breaker NB0216 to XNG06 Control
14NGG01AD	3505	NG002B	P	5.2.33	Breaker NG0207 to NG02BAF1
14NGG01AE	3505	NG002B	P	5.2.33	Breaker NG0207 to NG02BAF1
14NGG01AJ	3505	DSGN01B	P	5.2.30	Containment Cooler Fan B Motor
14NGG01BB	3505	NG004C	P	5.2.33	Breaker NG0406 to NG04CMF1
14NGG01BC	3505	NG004C	P	5.2.33	Breaker NG0406 to NG04CMF1
14NGG01BF	3505	DSGN01D	P	5.2.30	Containment Cooler Fan D Motor
14NGG11AA	3505	NG00201	C	5.2.33	Breaker NG0201 Control
14NGG11BA	3505	NG00401	C	5.2.33	Breaker NG0401 Control
14PKK11AA	3505	PK022	C	5.2.33	NG0409 Breaker Control
14PNG01AE	35-5	PN008	P	5.2.16	Non-Class 1E Electrical Equipment AC Distribution Panel
14RLK01AA	3505	RL001/RL002	P	5.2.34	125 VDC to RL001/RL002 from NK4407
14RLK01BA	3505	RL005/RL006	P	5.2.34	125 VDC to RL005/RL006 from NK4409
14RLK01CA	3505	RL017/RL018	P	5.2.34	125 VDC to RL017/RL018 from NK4412
14RLK01DA	3505	RL019/RL020	P	5.2.34	125 VDC to RL019/RL020 from NK4413
14RLK01EA	3505	RL021/RL022	P	5.2.34	125 VDC to RL021/RL022 from NK4414
14RLK01FA	3505	RL023/RL024	P	5.2.34	125 VDC to RL023/RL024 from NK4411
14RPK09AA	3505	RP210	P	5.2.4	125 VDC to RP210 from NK4417
14RPK15BA	3505	86XRP5	C	5.2.36	Control room lockout relay (RP335)
14RPK15CA	3505	86XRP6	C	5.2.36	Control room lockout relay (RP335)
14RPK15DA	3505	86XRP7	C	5.2.36	Control room lockout relay (RP335)

Table C-23-3
PFSSD Cables Located in Fire Area C-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14RPY09BA	3505	RP053BC	P	5.2.35	120 VAC to BOP Instrumentation Rack from NN0416
14RPY09CA	3505	RP053BC	P	5.2.35	120 VAC to BOP Instrumentation Rack from NN0418
14RPY10BA	3505	RP068	P	5.2.21	120 VAC to RP068 from NG02ACR136
14SAK21BA	3505	SA036B	P	5.2.8	125 VDC to SA036B from NK5409
14SAY21BA	3505	SA036B	P	5.2.8	120 VAC to SA036B from NN0403
14SAZ20HA	3505	SGK05B	C	5.2.28	Status Panel SA066B Input from SGK05B
14SBS01DC	3505	SB029A	P	5.2.37	120 VAC to SSPS A Input Panel from NN0409
14SBS02DC	3505	SB032A	P	5.2.37	120 VAC to SSPS B Input Panel from NN0410
14SBS05BE	3505	SB032D	P	5.2.37	120 VAC to SSPS B Output Panel from NN0412
14SBS05BF	3505	SB032D	P	5.2.37	125 VDC to SSPS B Output Panel from NK4416
14SBS10BB	3505	SB102B	P	5.2.38	125 VDC Power to SB102B from NK5410
14SBS12BC	3505	SB102B	C	5.2.38	Train B Reactor Trip Switchgear Cabinet
14SBS16AA	3505	BBTI0423X	I	5.2.39	RCS Cold Leg Loop 2 Temp Ind at RP118B (WR)
14SBS16BA	3505	AELI0504A	I	5.2.6	SG D Wide Range Level Indicator at RP118B
14SBS16EA	3505	BBTI0443A	I	5.2.39	RCS Hot Leg Loop 4 Temp Ind at RP118B (WR)
14SBS16NA	3505	BBPI0406X	I	5.2.39	RCS Wide Range Pressure Ind at RP118B
14SBS16XA	3505	AELI0502A	I	5.2.6	SG B Wide Range Level Indicator at RP118B
14SBS16YA	3505	AELI0504A	I	5.2.6	SG D Wide Range Level Indicator at RP118B
14SBS16ZA	3505	BBLI0460B	I	5.2.39	Pressurizer Level Indicator (NR) at RP118B

Table C-23-3
PFSSD Cables Located in Fire Area C-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14SBY09FA	3505	SB041	P	5.2.37	120 VAC to Process Protection Rack 4 from NN0414
14SES07BA	3505	SENY0061B	P	5.2.40	120 VAC to Source Range Monitoring from NN0408
14SES07CA	3505	SENY0061A	P	5.2.40	120 VAC to Source Range Monitoring from NN0406
16BBA01CC	3505	DPBB01C	C	5.2.41	Reactor Coolant Pump C Motor
16BBA01DC	3505	DPBB01D	C	5.2.41	Reactor Coolant Pump D Motor
16EJI12BA	3505	EJHCV0607	I	5.2.11	RHR B Heat Exchanger Outlet Flow Control (EJHY0607)
16FCY35AA	3505	FC170A	P	5.2.42	Steam Generator Feed Pump B Term Cabinet
16GKK31DB	3505	SGK05B	C	5.2.28	Fire Isolation Signal (95XGK08)
16KCQ21EA	3505	SGK05B	C	5.2.28	Fire Detection Actuation Circuit
16KCQ21FA	3505	SGK05A	C	5.2.28	Fire Detection Actuation Circuit
16KCQ21HA	3505	SGK05B	C	5.2.28	Fire Detection Actuation Circuit
16KCQ21JA	3505	SGK05A	C	5.2.28	Fire Detection Actuation Circuit
16NBA10AB	3505	XNB01	C	5.2.31	NB0212 Lockout Relay 286-2/T1 (MA104F)
16NBA11AC	3505	PA0201	C	5.2.31	NB0209 Lockout Relay 286-1/T2
16NBA11AE	3505	PA0201	C	5.2.31	NB0109 Lockout Relay 286-2/T2
16NBB03AB	3505	XNB01	P	5.2.31	XNB01 Phase Differential Relay 287/T1 (MA0104F)
16NBB05AD	3505	XNB02	P	5.2.31	XNB02 Phase Differential Relay 287/T2 (PA0201)
16NBB05AL	3505	XNB02	P	5.2.31	XNB02 Phase Differential Relay 287/T2 (PA0201)

Table C-23-3
PFSSD Cables Located in Fire Area C-23

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16PGA10CA	3505	PA0206	C	5.2.43	Load Centers PG12, PG16 and PG26 Fdr Bkr
16PGA11AC	3505	PA0207	C	5.2.43	Load Centers PG14, PG18, PG20 and PG24 Fdr Bkr
16PGG13DA	3505	PG2001	C	5.2.43	Load Center PG20 Feeder Breaker
16PNY01AR	3505	XPN08D	P	5.2.16	Alternate feed to PN08 from PG20GER5
16PNY02AA	3505	PN410	P	5.2.44	120 VAC Power from PN04 (Hot Side)
16PNY02AB	3505	PN410	P	5.2.44	120 VAC Power from PN04 (Neutral)
16RLY01DA	3505	RL017/RL018	P	5.2.11	120 VAC to ESF Control Panel
16RLY01EA	3505	RL021/RL022	P	5.2.26	120 VAC to Reactor Auxiliary Control Pnl
16RLY01GA	3505	RL023/RL024	P	5.2.3	120 VAC to Turbine Generator & Feedwater Control Panel

5.2.1 Steam Generator Atmospheric Relief Valves

PFSSD requires at least two steam generator atmospheric relief valves (ARVs) be controlled and the other two closed. The ARVs are pneumatically operated using air from the compressed air system (KA) or nitrogen from the nitrogen accumulators. The valves open by pneumatic pressure and close by spring action. The valves are automatically controlled by a pressure transmitter installed on the outlet side of the steam generator. Alternatively, each valve can be controlled manually from the control room or the auxiliary shutdown panel by placing the pressure indicating controller (PIC) in manual.

As discussed in Section 5.2.8, a fire in this area could affect the Train B motor driven auxiliary feedwater pump (MDAFP) and the turbine driven auxiliary feedwater pump (TDAFP). Therefore, only the Train A MDAFP is available to feed steam generators B and C. Consequently, steam generator ARVs ABPV0001 and ABPV0004 need to be isolated and steam generator ARVs ABPV0002 and ABPV0003 need to be controlled.

Several cables associated with steam generator ARV ABPV0004 are run in area C-23, as identified in Table C-23-3. Damage to these cables could prevent isolating ABPV0004 from the control room. If this occurs, an operator can close it by isolating air and nitrogen supply valves KAV1429 and KAV1365, respectively in fire area A-23. Cables for the remaining ARVs are not run in area C-23 and, therefore, the PFSSD function for controlling two steam generators is satisfied.

Based on the above discussion, steam generator atmospheric relief valve control can be achieved by one local operator action outside the control room.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB20B, E-1F9101, J-14KA81, M-12AB01, M-12KA05

5.2.2 Safety Injection and Containment Spray

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. A spurious containment spray actuation signal (CSAS) could cause the containment spray pumps to operate, depleting inventory in the RWST. These conditions are not desirable for PFSSD at Wolf Creek.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Containment spray (CS) is initiated automatically by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937.

A cable (14BBI16NB) associated with pressurizer pressure transmitter BBPT0458 is run in area C-23. Cables associated with the remaining pressurizer pressure transmitters do not run in area C-23. Consequently, a fire in area C-23 cannot cause a spurious SIS due to low pressurizer pressure.

Based on the above discussion, a spurious SIS and CSAS cannot occur if a fire occurs in this area.

References: E-15000, XX-E-013, E-13AB21, E-13BB16, E-13GN05, E-1F9431, E-1F9432, E-1F9433, M-12AB01, M-12BB02, M-12GN01

5.2.3 Main Steam Isolation Valves Downstream Components

The main steam isolation valves downstream components are used for PFSSD to isolate the main steam lines in the event the MSIVs or MSIV bypass valves fail to close.

Cable 16RLY01GA supplies 120 VAC power from PG20GBR217 to control room panel RL023/RL024. At RL023/RL024, the power is split and supplies power to FCHV0103, ABLV0050 and ABLV0052, as well as other non-PFSSD components. These components are required to be functional for PFSSD in the event the MSIVs and MSIV bypass valves cannot be isolated. Loss of power will cause the valves to remain open.

As discussed in Sections 5.2.4 and 5.2.5, the MSIVs and the MSIV bypass valves can be isolated using hand switch ABHS0080 if a fire occurs in area C-23. Therefore, these downstream valves can fail open with no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-13RL01, E-13RL07, E-1F9103, E-1F9424E, M-12AB03

5.2.4 Steam Generator Main Steam Isolation Bypass Valves

PFSSD requires that the bypass valves for the main steam isolation valves be closed to prevent reactivity addition due to uncontrolled cooldown. The bypass valves are closed from the control room using all close hand switches ABHS0079 (Train B) or ABHS0080 (Train A).

Each of the four MSIV bypass valves (ABHV0012, ABHV0015, ABHV0018 and ABHV0021) has two redundant solenoids that control the position of the associated valve. The bypass valves are normally closed with the solenoids de-energized. Both solenoids need to be energized to open the valve. One of the solenoids on each valve is on separation group 1 (Train A) and is controlled by hand switch ABHS0080. The other solenoids on each valve are on separation group 4 (Train B) and are controlled by hand switch ABHS0079.

Separation group 4 MSIV bypass solenoid valve cables (14ABK23FA, 14ABK23FB, 14ABK23FC, 14ABK23FD, 14ABK23FE, 14ABK23FF and 14ABK23FG) are run in this area. Damage to these cables could impact the ability to close the valves using hand switch ABHS0079. Redundant means are available to ensure the MSIV bypass valves are closed. Hand switch ABHS0080 is unaffected by the fire and can be used to close the bypass valves if they are open at the time of the fire.

Cable 14RPK09AA supplies 125 VDC power from NK4417 to auxiliary relay panel RP210. The PFSSD loads supplied by this cable are as follows:

- Relay 94XAB06
- Solenoid valve ABHY0012B
- Solenoid valve ABHY0015B
- Solenoid valve ABHY0018B
- Solenoid valve ABHY0021B

The solenoid valves listed above are associated with MSIV bypass valves ABHV0012, ABHV0015, ABHV0018 and ABHV0021. Damage to cable 14RPK09AA will cause a loss of power to the relay and solenoids and fail the valves closed, which is the desired PFSSD position. Therefore, damage to cable 14RPK09AA will not adversely impact PFSSD.

Based on the above discussion, the MSIV bypass valves can be isolated using hand switch ABHS0080 in the main control room.

References: E-15000, XX-E-013, E-13AB23B, E-13RP09, E-1F9101, E-1F9422B, E-093-00050, E-093-00051, M-12AB02

5.2.5 Steam Generator Main Steam Isolation Valves

PFSSD requires that the main steam isolation valves (MSIVs) be closed to prevent reactivity addition due to uncontrolled cooldown. The MSIVs are closed from the control room using all close hand switches ABHS0079 (Train B) or ABHS0080 (Train A).

Cable 14ABK30BB provides 125 VDC power from NK5423 to Train B main steam and feedwater isolation actuation system (MSFIS) cabinet SA075B. A loss of 125 VDC power to SA075B will cause a loss of power to the Train B solenoid valves on each MSIV and fail the MSIVs closed, which is the desired PFSSD position. In addition, the Train A MSFIS actuation cabinet SA075A is unaffected by a fire in area C-23 and ABHS0080 is available to close the MSIVs.

Based on the above discussion, the MSIVs would likely fail closed in the event a fire in area C-23 damages cable 14ABK30BB. Hand switch ABHS0080 is unaffected by a fire in this area and can be used from the control room to isolate the MSIVs.

References: E-15000, XX-E-013, E-13AB30, E-1F9101, M-12AB02

5.2.6 Steam Generator Level Indication

The decay heat removal function for PFSSD requires the use of two RCS loops and two Steam Generators. Steam generator (SG) level indication is required to support this function. A fire in area C-23 uses MDAFP A to supply SGs B and C. Therefore, level indication on steam generators B and C is required.

Cables 14AEI08PB and 14AEI08QB associated with SGs B and C level transmitters AELT0527 (SGB NR) and AELT0537 (SGC NR) run in this area. Damage to these cables could prevent accurate level indication on AELI0527 and AELI0537 in the main control room. Cables associated with the remaining level transmitters on steam generators B and C do not run in this area. Therefore, level indication will be available on steam generators B and C using the following level transmitters:

Steam Generator	Available Level Indication
B	AELI0502 (WR), AELI0528 (NR), AELI0529 (NR), AELI0552 (NR)
C	AELI0503 (WR), AELI0538 (NR), AELI0539 (NR), AELI0553 (NR)

Cables 14SBS16BA, 14SBS16XA and 14SBS16YA, associated with SGs B and D level indicators AELI0502A and AELI0504A at the auxiliary shutdown panel (ASP) are run in fire area C-23. The ASP is not credited if a fire occurs in this area so loss of indication at the ASP will have no adverse impact on PFSSD.

Cables 14AEI08LB, 14AEI08NB and 14AEI08RB associated with SGs A and D level transmitters AELT0504, AELT0517 and AELT0547 are run in this area. Since SGs A and D

are not credited for a fire in this area, damage to these cables will have no adverse impact on PFSSD.

Based on the above discussion, steam generator B and C level indication is assured if a fire occurs in area C-23.

References: E-15000, XX-E-013, E-13AE08, E-13SB16, E-1F9203, M-12AE02

5.2.7 Steam Generator Main Feedwater Isolation Valves

PFSSD requires that either the main feedwater isolation valves (MFIVs) be closed or the main feedwater pumps be stopped to prevent overfilling the steam generators. Flow diversion from auxiliary feedwater (AFW) to the main feedwater system piping is prevented by check valves AEV0420, AEV0421, AEV0422 and AEV0423. Closure of the main feedwater isolation valves is not required to prevent AFW flow diversion.

Cable 14ABK30BB provides 125 VDC power to Train B main steam and feedwater isolation actuation system (MSFIS) cabinet SA075B from NK5423. Damage to this cable would disrupt power to the separation group 4 solenoids and close the MFIVs, which is the desired PFSSD position. In addition, the Train A MSFIS is unaffected by the fire and AEHS0080 is available to close the MFIVs.

Based on the above discussion, the MFIVs would likely fail closed in the event a fire in area C-23 damages cable 14ABK30BB. Hand switch AEHS0080 is unaffected by a fire in this area and can be used from the control room to isolate the MFIVs.

References: E-15000, XX-E-013, E-13AB30, E-1F9201, M-12AE02

5.2.8 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire AFW demand to achieve cold shutdown.

Motor operated valves (MOVs) in the system allow operators to line up the auxiliary feedwater system as required to achieve and maintain safe shutdown. Damage to the MOV circuits due to a fire could prevent operators from lining up the system from the control room.

Several PFSSD cables associated with various components of the auxiliary feedwater system (AL) run through fire area C-23. These cables are identified in Table C-23-3. Damage to these cables could prevent operation of the Train B MDAFP. In addition, motor operated valves in the flowpath from the Train B MDAFP to steam generator D and from the TDAFP to steam generator B could spuriously close. Cables associated with the TDAFP and the Train A MDAFP are unaffected by a fire in this area. The TDAFP is available to take suction from either the CST or the Train A ESW system and supply steam generators A, B and D. The Train A MDAFP is available to take suction from either the CST or the Train A ESW system and supply steam generators B and C.

Power cables associated with SA036B are run in this area. Damage to these cables could result in a loss of power to the panel but panels SA036A and SA036C remain available. Therefore, automatic operation of low suction pressure (LSP) swapover is available.

A cable associated with the Train B MDAFP room cooler motor (DSGF02B) is run in this area. Damage to this cable could prevent operation of the cooler motor. The Train A MDAFP room cooler motor (DSGF02A) is unaffected.

Based on the above discussion, auxiliary feedwater is assured if a fire occurs in area C-23 using Train A MDAFP supplying auxiliary feedwater to steam generators B and C and the TDAFP supplying auxiliary feedwater to steam generators A, C and D.

References: E-15000, XX-E-013, E-13AL01B, E-13AL02B, E-13AL03B, E-13AL04B, E-13AL05B, E-13AL07B, E-13AL09, E-13GF01, E-13SA21, E-1F9202, E-1F9203, E-1F9204, E-1F9402A, E-1F9402B, E-1F9444, J-10SA, M-12AL01, M-12GF01

5.2.9 Reactor Coolant Pump (RCP) Seal Injection

PFSSD requires RCP seal injection to provide a boron injection path, provide makeup to the RCS to maintain hot standby inventory and prevent damage to the RCP seals. The Component Cooling Water (CCW) system is an alternative means of cooling the RCP seals.

Power and control cables associated with seal injection valves BBHV8351A, BBHV8351B, BBHV8351C and BBHV8351D, are run in this area. The valves are normally open and de-energized and are required to remain open during a fire. The valves are not high/low pressure interface valves so three-phase hot shorts do not have to be considered and, consequently, damage to the power cables will not cause the valves to close. Damage to the control cable for each valve located in this area will not cause the valves to spuriously close since a hot short or open circuit in these cables will not bypass the control room hand switch. Furthermore, the valves are de-energized so cable damage could not cause the valves to close.

Cable 14BGG52BC is associated with Train B RCP seal injection flow throttling valve BGHV8357B. Damage to this cable could prevent the Train B centrifugal charging pump (CCP) from supplying water to the RCP seals. Train A seal injection flow throttling valve BGHV8357A is unaffected by a fire in this area.

Cable 14BGI51BA is associated with RCP seal total flow transmitter BGFT0215B. Damage to this cable could cause a loss of seal flow indication on BGFI0215B. RCP seal total flow indicator BGFI0215A is unaffected by a fire in area C-23 and can be used to diagnose a loss of RCP seal injection.

Based on the above discussion, RCP seal injection is available if a fire occurs in fire area C-23 using the Train A CCP. RCP seal total flow indicator BGFI0215A can be used to diagnose a loss of RCP seal injection in the event of a loss of the operating charging pump.

References: E-15000, XX-E-013, E-13BB04, E-13BG51, E-13BG52, E-1F9102, E-1F9302, E-1F9303, M-12BB03

5.2.10 Component Cooling Water

The component cooling water system is required for PFSSD to provide cooling water to the CCP oil coolers, seal water heat exchanger, RHR heat exchanger and RHR pump seal cooler. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Cables associated with components on the Train B CCW system run through area C-23. Damage to these cables due to a fire could prevent operation of the associated equipment and prevent operation of Train B CCW. Cables associated with redundant Train A CCW are run in a different fire area and are unaffected by the fire.

Cables associated with Train B CCW pump room cooler SGL11B run in area C-23. Damage to these cables could prevent operation of the unit. Cables associated with redundant Train A CCW and room cooler SGL11A are run in a different fire area and are unaffected by the fire.

As discussed in Section 5.2.9, RCP seal injection is unaffected by a fire in this area. Therefore, the CCW to thermal barrier cooling coil flow path is not required to ensure adequate seal cooling.

Cables associated with valves EGHV0062, EGHV0127 and EGHV0133 run through area C-23. If the fire affects cables associated with EGHV0062 the valve may spuriously close. If this occurs, operators can open bypass valve EGHV0132 from the control room if thermal barrier cooling is desired. This is not a time critical action since RCP seal injection is unaffected.

Based on the above discussion, Train A CCW is available to provide cooling to essential PFSSD components.

References: E-15000, XX-E-013, E-13EG01C, E-13EG01D, E-13EG10, E-13EG13, E-13EG16, E-13EG18, E-13EG18A, E-13GL06, E-1F9303, E-1F9401A, E-1F9401B, E-1F9444, M-12EG01, M-12EG02, M-12EG03, M-12GL02

5.2.11 Residual Heat Removal (RHR)

PFSSD requires one train of residual heat removal (RHR) to be available for shutdown cooling. The RHR system is not used for hot standby.

Hot shutdown requires isolation of the RCS to RHR flow path by maintaining either BBPV8702A or EJHV8701A closed and either BBPV8702B or EJHV8701B closed. Cold shutdown requires RHR taking suction from the RCS. RHR pump suction from the RCS is controlled by valves BBPV8702A and EJHV8701A (Train A) and BBPV8702B and EJHV8701B (Train B). The PFSSD methodology credits Train A RHR to achieve cold shutdown if a fire occurs in area C-23. At Wolf Creek, these valves are considered high/low pressure interface components for PFSSD analysis purposes.

A control cable associated with RHR pump B motor (DPEJ01B) could be damaged, causing a spurious pump start or preventing the pump from being started. Cables associated with RHR pump A are unaffected by a fire in area C-23.

Cables 14BBG12AF and 14BBG12AG are control cables associated with BBPV8702A. An inter-cable (cable-to-cable) hot short between cables 14BBG12AF and 14BBG12AG will bypass the control room hand switch and provide the permissive to open BBPV8702A. Valve EJHV8701A will remain closed since cables associated with this valve are not run through area C-23. Furthermore, BBPV8702A and EJHV8701A are administratively maintained closed with the breaker locked open. The 3-phase power cables associated with both valves are not run in this area, so a 3-phase hot short is not credible.

Cables 14BBG12BF and 14BBG12BG are control cables associated with BBPV8702B. An inter-cable (cable-to-cable) hot short between cables 14BBG12BF and 14BBG12BG will bypass the control room hand switch and provide the permissive to open BBPV8702B. Valve EJHV8701B will remain closed since cables associated with this valve are not run through area C-23. Furthermore, BBPV8702B and EJHV8701B are administratively maintained closed with the breaker locked open. The 3-phase power cables associated with both valves are not run in this area, so a 3-phase hot short is not credible.

An open circuit in cable 14BBG12AF could prevent remote opening of valve BBPV8702A when transitioning to RHR. If this occurs, a cold shutdown repair or a containment entry will be necessary to open the valve. Valve EJHV8701B can be controlled from the control room.

Valve EGHV0101 is the Train A CCW to RHR Heat Exchanger control valve. Valve EGHV0102 is the Train B CCW to RHR Heat Exchanger control valve. These valves are normally closed during power operation. PFSSD requires that the valve on the operating train of CCW be closed until shutdown cooling mode is entered, at which time the valve on the operating train of RHR needs to be open. As stated in Section 5.2.10, the Train B CCW system may not be available to supply cooling water to the Train B RHR heat exchanger. Cables 14EGG07BA and 14EGG07BB are associated with valve EGHV0102. Damage to the cables could prevent operation of EGHV0102 but would not cause the valve to spuriously open. Valve EGHV0101 is unaffected by a fire in this area.

When RHR pumps are operating, the associated mini-flow valve (EJFCV0610 or EJFCV0611) needs to be controlled. The mini-flow valves prevent RHR pump overheating by re-circulating water from the discharge side of the RHR heat exchanger to the suction side of the RHR pump. The mini-flow valve opens when the flow indicator measures low flow and closes on high flow. Damage to cable 14EJG08BC could prevent mini-flow valve EJFCV0611 from operating properly. If the Train B RHR pump spuriously starts and EJFCV0611 fails to operate, the pump could be damaged. This is a commercial concern only since Train A RHR pump and mini-flow valve EJFCV0610 are unaffected by a fire in this area.

The RHR heat exchanger discharge control valve on the operating train (EJHCV0606 (Train A) or EJHCV0607 (Train B)) needs to be available. Cable 16EJI12BA, which is associated with EJHCV0607, runs through area C-23. Cable 16RLY01DA provides 120 VAC power to RL017/RL018 (EJHY0607) from PN0833. Damage to these cables could result in a loss of valve EJHCV0607. Valve EJHCV0606 is unaffected by a fire in this area.

RHR pump A discharge to CVCS control valve EJHV8804A needs to be closed when operating the Train A RHR system. RHR pump B discharge to SI Pump B control valve EJHV8804B needs to be closed when operating the Train B RHR system. Damage to cable 14EJG04BC could cause valve EJHV8804B to spuriously open. The Train A RHR system is credited for a fire in this area so spurious opening of EJHV8804B will have no adverse impact on PFSSD. Cables associated with EJHV8804A do not run in area C-23.

Cables associated with Train B RHR pump discharge to RCS cold leg isolation valve EJHV8809B run in area C-23. Damage to these cables could prevent operating the valve from the control room. Cables associated with Train A RHR pump discharge to RCS cold leg isolation valve EJHV8809A do not run in area C-23. Consequently, valve EJHV8809A is unaffected by a fire in area C-23.

The cold shutdown mode of PFSSD requires isolation of hot leg recirculation. Valve EJHV8840 is used to isolate RHR flow to the RCS hot leg loops 2 and 3. This valve is normally closed and is required to be closed for cold shutdown. During hot standby, the valve can be in any position. Cables associated with valve EJHV8840 run through area C-23. Damage to cables 14EJG09AC and 14EJG09AD would likely result in valve EJHV8840 remaining in its as-is normally closed position, which is the preferred PFSSD position. However, two proper intra-cable hot shorts in cable 14EJG09AD or one intra-cable hot short in cable 14EJG09AD combined with a short to ground on conductor U1 would spuriously open the valve.

As stated above, the position of valve EJHV8840 (open or closed) will not affect hot standby. The valve needs to be closed for cold shutdown. The valve has been modified to address NRC IN 92-18 and can be closed manually prior to entering shutdown cooling mode. The torque and limit switches are not bypassed by postulated damage to these cables.

Based on the above discussion, the Train B RHR system could be affected by a fire in this area but the Train A RHR system is available. Valve BBPV8702A may need to be manually opened and valve EJHV8840 may need to be manually closed when transitioning to Train A RHR for shutdown cooling.

References: E-15000, XX-E-013, E-13BB12A, E-13BB12B, E-13EG07A, E-13EJ01, E-13EJ04B, E-13EJ08A, E-13EJ09C, E-13EJ12, E-13RL01, E-13RL04, E-1F9205, E-1F9301, E-1F9401A, E-1F9421, M-12BB01, M-12EJ01

5.2.12 Pressurizer Power Operated Relief Valves and Associated Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed. Cables and components associated with PORV BBPCV0456A and associated block valve BBHV8000B are run through area C-23. Cables and components associated with PORV BBPCV0455A and associated block valve BBHV8000A are not located in area C-23.

The pressurizer PORVs are not considered high/low pressure interfaces. The valves are supplied power by an ungrounded 125 VDC system. Therefore, based on GL 86-10, consideration of multiple proper polarity hot shorts is not required. A single proper polarity hot short still needs to be considered.

In the event a fire causes BBPCV0456A to open and damages BBHV8000B cables, Operators can close BBPCV0456A by placing hand switch BBHIS0456A, located on RL021, in the close position. Pressurizer level and RCS pressure indication are available to diagnose a failed open PORV using BBLI0459A, BBLI0460A and BBPI0405. In addition, pressurizer pressure indication is available using BBPI0455A, BBPI0456 and BBPI0457.

An instrument cable (14BBI16NB) associated with pressurizer pressure transmitter BBPT0458 is run in fire area C-23. Damage to this cable could send a spurious high-pressure signal to the Ovation pressure control system. However, as discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure channel will not cause the spurious operation of the pressurizer PORVs.

Based on the above discussion, pressurizer PORV BBPCV0456A could spuriously open due to damage to the PORV control cables and block valve BBHV8000B may not close due to cable damage. The PORV can be closed using hand switch BBHIS0456A in the main control room.

References: XX-E-013, E-15000, E-13BB16, E-13BB39, E-13BB40, E-1F9301, E-1F9421, M-12BB02, CR 13079, DCP 12944, DCP 13324

5.2.13 Reactor Coolant System (RCS) Pressure Indication

The PFSSD design requires RCS pressure indication to be available. RCS pressure indication is provided in the control room using BBPI0405 or BBPI0406. Cable 14BBI16BA and 14BBI16BB associated with pressure transmitter BBPT0406 are located in fire area C-23. Damage to these cables could prevent RCS pressure indication on BBPI0406.

Cables associated with redundant RCS pressure transmitter BBPT0405 are unaffected by a fire in this area. Therefore, RCS pressure indication is available using BBPI0405.

References: E-15000, XX-E-013, E-13BB16, E-1F9201, E-1F9205, M-12BB04

5.2.14 Reactor Head Vent Valves

PFSSD requires that one of the two reactor vessel head vent valves on each flow path (2 flow paths total) be closed to prevent uncontrolled depressurization of the RCS. Either BBHV8001A or BBHV8002A and either BBHV8001B or BBHV8002B needs to be closed.

A cable (14BBK30DA) associated with one of the four head vent valves (BBHV8002B) runs through area C-23. Cables for remaining head vent valves BBHV8001A, BBHV8002A and BBHV8001B are not run through C-23 and are unaffected by the fire. Therefore, at least one valve on each flow path can be controlled and spurious opening of BBHV8002B will have no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-13BB30, E-1F9301, M-12BB04

5.2.15 Centrifugal Charging Pumps

At least one centrifugal charging pump (CCP) is required for PFSSD to provide RCP seal cooling, reactivity control and inventory control. These functions are accomplished using a CCP taking suction from the refuelling water storage tank (RWST) and injecting through the RCP seals. RCP seal injection provides approximately 20 gpm makeup to the RCS and provides adequate boron concentration to maintain sub-critical reactivity conditions. If RCP seal injection is unavailable, reactivity and inventory control is provided by lining up the CCPs to the boron injection tank (BIT). The normal charging pump (NCP) is not credited and is assumed lost.

A control cable associated with Train B CCP motor DPBG05B runs through area C-23. Damage to this cable could prevent operation of the pump. Redundant Train A CCP cables are run in a separate fire area and are unaffected by a fire.

Two control cables associated with Train B CCP miniflow valve BGHV8111 are run through area C-23. Cables for Train A miniflow valve BGHV8110 are run in a different area and are unaffected by a fire in area C-23.

Cables associated with RWST to CCP B control valve BNLCV0112E are run in this area. Damage to these cables could prevent opening or cause spurious closure of the valve. Redundant valve BNLCV0112D is unaffected by a fire in area C-23.

Based on the above discussion, the Train A CCP is available if a fire occurs in area C-23.

References: XX-E-013, E-15000, E-13BG01A, E-13BG11C, E-13BN01A, E-1F9102, E-1F9302, E-1F9401A, M-12BG03, M-12BN01

5.2.16 Non-Class 1E 120 VAC Electrical Distribution System

The PFSSD function of the non-Class 1E 120 VAC electrical distribution system is to supply 120 VAC power to Main Control Boards (MCBs) RL017/RL018 and RL021/RL022. The power is split at the MCB to supply PFSSD components.

The PFSSD components that depend on 120 VAC power from RL017/RL018 are Residual Heat Removal (RHR) discharge valves EJHCV0606 (Train A) and EJHCV0607 (Train B). Non-class 1E switchboard panel PN07 supplies power from switch PN0736 to solenoid valve EJHY0606. Solenoid valve EJHY0606 controls the position of EJHCV0606 using hand controller EJHIC0606. Non-class 1E switchboard panel PN08 supplies power from switch PN0833 to solenoid valve EJHY0607. Solenoid valve EJHY0607 controls the position of EJHCV0607 using hand controller EJHIC0607.

The PFSSD components that depend on 120 VAC power from RL021/RL022 are temperature recorders BBTR0423, BBTR0433 and BBTR0443. Non-class 1E switchboard panel PN07 supplies power from switch PN0738 to temperature recorder BBTR0423. Non-class 1E switchboard panel PN08 supplies power from switch PN0835 to temperature recorders BBTR0433 and BBTR0443.

Cable 14PNG01AE supplies 480 VAC power from NG002BBF1 to 480/120V transformer XPN08A. Damage to this cable will result in a loss of power to the transformer and loss of 120 VAC feed to PN08 from this power source.

Cable 16PNY01AR provides an alternate power feed to switchboard PN08 from PG20GER5. Damage to this cable will result in a loss of the alternate power feed to PN08.

A loss of power to PN08 will result in a loss of power to EJHY0607, which will fail valve EJHCV0607 open and will prevent control of the valve from the control room. Loss of power to PN08 will also result in a loss of loops 3 and 4 temperature recorders BBTR0433 and BBTR0443, respectively.

Non-Class 1E 120 VAC power to panel PN07 is unaffected by a fire in this area. Train A RHR valve EJHCV0606 is unaffected by a fire in area C-23, so Train A RHR can be used for shutdown cooling. Also, operators can use available temperature indication on loops 1 and 2 if a loss of loops 3 and 4 temperature indication occurs.

Based on the above discussion, a fire in this area could result in a loss of power to PN08 but PN07 is unaffected.

References: XX-E-013, E-15000, E-13PN01, E-13RL01, E-13RL04, E-13RL06, E-1F9201, E-1F9205, E-1F9421, E-1F9424E

5.2.17 Volume Control Tank (VCT) Discharge Valves

PFSSD requires isolation of the Volume Control Tank (VCT) discharge to charging pumps suction by closing either valve BGLCV0112B or BGLCV0112C.

Power and control cables associated with BGLCV0112C are run in area C-23. Damage to these cables could prevent closing this valve from the control room or could cause the valve to spuriously close prior to lining up the RWST. If the valve closes prior to lining up the RWST, damage to the operating charging pump could occur. The assumptions in calculation XX-E-013 state that systems and components are in their normal operating position or status prior to the fire. The Normal Charging Pump (NCP) is the normally operated pump and is assumed to be operating at the time of the fire. Inadvertent closure of valve BGLCV0112C with no suction from the RWST would result in damage to the NCP but the centrifugal charging pumps would remain unaffected. As stated in 5.2.15, the Train B CCP may be unavailable but the Train A CCP is unaffected by the fire.

Cables associated with BGLCV0112B are unaffected by a fire in this area. Therefore, BGLCV0112B can be isolated from the control room after the RWST has been lined up.

References: E-15000, XX-E-013, E-13BG12A, E-13BN01A, E-1F9102, E-1F9302, M-12BG03, M-12BN01

5.2.18 Excess Letdown

The excess letdown flowpath is required to be isolated to prevent uncontrolled depressurization of the RCS. Therefore, either normally closed valve BGHV8153A or BGHV8154A must be maintained closed and either normally closed valve BGHV8153B or BGHV8154B must be maintained closed.

One cable associated with BGHV8154B runs through fire area C-23. The remaining valves are unaffected and will remain closed if a fire occurs in area C-23.

References: E-15000, XX-E-013, E-1F9301, E-13BG48, M-12BG01

5.2.19 Steam Generator Blowdown to Blowdown Flash Tank Isolation Valves

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown. Cables associated with these valves are run in area C-23. An open circuit in these cables will fail the valves closed, which is the desired PFSSD position. A hot short on these cables could prevent the valves from being closed using hand switches BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A in the main control room.

Redundant capability exists for closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004. The redundant means uses BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C, located on the BM157 panel in the radwaste control room. Access is available without traversing area C-23.

Although the configuration is not in literal compliance with 10CFR50, Appendix R, feasible manual actions are available and are unaffected by the fire.

Thermal hydraulic analysis WCNOC-CP-002 shows insignificant impact on SG inventory even with all four blowdown valves open. Therefore, no E-1F9900 OMA is required to close blowdown valves to achieve and maintain hot standby. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 34.

References: E-15000, XX-E-013, E-13BM06A, E-1F9101, M-12BM01

5.2.20 Refueling Water Storage Tank (RWST) and Containment Sump Isolation Valves

The RWST is credited in the PFSSD analysis as the primary source of borated water to achieve cold shutdown. The Wolf Creek Technical Specifications ensure the minimum quantity and boron concentration is maintained to achieve cold shutdown.

To prevent draindown of the RWST into the containment sump, PFSSD requires that either valve BNHV8812A or valve EJHV8811A and valve BNHV8812B or valve EJHV8811B be closed during hot standby. For cold shutdown, the operating train containment sump valve (EJHV8811A or EJHV8811B) must be maintained closed to prevent flow diversion from the RCS to the containment sump. Valves BNHV8812A and BNHV8812B are normally open and valves EJHV8811A and EJHV8811B are normally closed.

Cable 14BNG03BC, associated with valve BNHV8812B, run through area C-23. Damage to this cable could prevent closure of the valve from the control room and could prevent automatic closure when valve EJHV8811B is fully open.

Cable 14EJG06BC, associated with EJHV8811B, runs through area C-23. Damage to this cable will not cause the valve to spuriously open.
The RWST level transmitters and associated circuits are included in the PFSSD analysis because of the automatic functions they perform. A low-low level in the RWST on 2 out of 4 RWST level transmitters, coincident with a safety injection signal, will provide a permissive for containment sump isolation valves EJHV8811A and EJHV8811B to open. This could cause the RWST to drain to the containment sump if the associated RWST to RHR valve does not close. Cable 14BNI07FA, associated with RWST level transmitter BNLT0933, is run in area C-23. Circuits for the remaining three RWST level transmitters are not run in area C-23. Therefore, a spurious low-low RWST level signal will not occur.

Based on the above discussion, RWST inventory is unaffected by a fire in area C-23.

References: E-15000, XX-E-013, E-13BN03A, E-13EJ06B, E-13BN07, E-1F9102, E-1F9204, E-1F9205, M-12BN01, M-12EJ01

5.2.21 Essential Service Water

Either the Train A or the Train B essential service water (ESW) system is required to be available to ensure PFSSD. The ESW system supplies water to the following PFSSD components on the associated train:

- CCP room cooler
- RHR pump room cooler
- Class 1E switchgear room A/C condenser
- diesel generator engine cooling
- control room A/C condenser
- auxiliary feedwater pump room cooler
- motor and turbine driven auxiliary feedwater pump suction (backup to CST)
- containment air coolers
- electrical penetration room cooler
- component cooling water pump room cooler
- component cooling water heat exchanger
- component cooling water system makeup

A number of components associated with Train B ESW system could be affected by a fire in this area. The Train B ESW pump and a number of Train B ESW control valves could spuriously operate or may not operate when required. The Train B ESW pump room supply fan and associated dampers may not operate. Therefore, the Train B ESW system cannot be relied on if a fire occurs in this area.

The service water system provides the normal source of water to the ESW piping. Service water supply to and return from the ESW piping is each controlled by two valves installed in series. One of the two valves on each leg is required to be closed for PFSSD to prevent flow diversion from the credited ESW system. As discussed in the previous paragraph, the Train B ESW system may not be available if a fire occurs in this area. One valve (EFHV0025) on the Train A service water to ESW piping supply line and one valve (EFHV0039) on the Train A ESW to service water return line may be affected by the fire and may not close on a signal from the control room. Redundant valves EFHV0023 and EFHV0041 are unaffected by the fire and will close on a signal from the control room. Therefore, the ESW/service water cross connects can be isolated if a fire occurs in this area. In addition, check valve EFV0470 is installed between valves EFHV0023 and EFHV0025 and will prevent flow diversion from Train A ESW to the service water system. Also, check valve EFV0471 is installed between valves

EFHV0024 and EFHV0026 and will prevent flow diversion from Train B ESW to the service water system.

Cable 14RPY10BA supplies 120 VAC control power to the automatic and manual start circuits for the Train B ESW pump room supply fan CGD01B. The control power is supplied via this cable to control room panel RP068. If power is lost due to damage to this cable, then the Train B ESW pump room supply fan will not start either automatically, when the ESW pump starts, or manually from the control room. If this occurs, the Train A ESW pump room supply fan remains unaffected by the fire.

Cables 14GDY01BA, 14GDY01BB and 14GDY01BD are associated with Train B ESW pump room supply fan CGD01B. Damage to these cables could prevent operation of the supply fan. Train A ESW pump room supply fan CGD01A is unaffected by a fire in this area.

The Train A ESW system is unaffected by a fire in area C-23 and ESW remains available in the event of a fire in this area.

References: E-15000, XX-E-013, E-13EF02, E-13EF02A, E-13EF03, E-13EF06A, E-13EF07A, E-13EF08A, E-13EF09A, E-13EF11, E-13RP10, E-K3EF01A, E-K3EF08, E-K3GD01A, E-K3GD04, E-K3GD04A, J-201-00133, E-1F9402A, E-1F9402B, E-1F9403, E-1F9424B, E-1F9443, M-12EF01, M-12EF02, M-K2EF01, M-K2GD01

5.2.22 Safety Injection (SI) Pumps

The preferred PFSSD condition of the SI pumps is off. Therefore, a spurious start of the SI pumps should be avoided or mitigated. A control cable (14EMB01BB) associated with Train B SI pump PEM01B runs through area C-23 and could cause a spurious start of the pump and prevent stopping the pump from the control room.

If the Train B SI pump spuriously starts with the reactor at normal pressure, PFSSD will be assured. The pump will not discharge into the RCS due to the pressure differential between the RCS (approximately 2,235 psig) and the SI pump shutoff pressure (approximately 1,565 psig). In addition, the setpoint of the discharge relief valve (EM8853B) to the Recycle Holdup Tank is 1,825 psig. Therefore, no inventory is lost from the RWST if the SI pumps spuriously start. With the SI pump operating with no flow, damage to the pump could occur, which is a commercial concern since the SI pump is not credited in the PFSSD analysis. If necessary, the pump can be stopped by opening breaker NB0202, but this action is not required for PFSSD.

Based on the above discussion, spurious operation of the Train B SI pump will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13EM01, E-1F9102, E-1F9302, M-12EM01, M-721-00096, WCRE-01

5.2.23 Boron Injection Tank Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

As discussed in Section 5.2.9, RCP seal injection is available. Therefore, the BIT flowpath is not required for inventory control and boration during hot standby. The BIT flowpath is still necessary for cold shutdown. Cables associated with BIT inlet and outlet valves are not run in this area. Therefore, BIT injection can be lined up from the control room.

To prevent CCP flow diversion through the SIS test line when charging through the BIT, valves EMHV8843 and EMHV8882 need to be closed. If either or both of these valves cannot be closed, then closing or maintaining closed either valve EMHV8871 or EMHV8964 will prevent flow in the SIS test line. Cables associated with EMHV8843 and EMHV8871 are run in this area. Damage to these cables could cause the valves to open. Cables associated with EMHV8964 do not run in area C-23. Therefore, valve EMHV8964 can be controlled to prevent flow through the SIS test line when charging through the BIT.

Based on the above discussion, the BIT flowpath is not required for hot standby due to the availability of RCP seal injection. The BIT flowpath is available for cold shutdown.

References: E-15000, XX-E-013, E-13EM02A, E-13EM02B, E-13EM04, E-13EM04A, E-1F9302, M-12EM01, M-12EM02

5.2.24 Containment Spray (CS) Pumps

Spurious start of the CS pumps may complicate PFSSD due to the possible depletion of inventory in the RWST. Therefore, a spurious start of the CS pumps should be avoided or mitigated. A control cable (14ENB01BB) associated with Train B CS pump PEN01B runs through area C-23 and could cause a spurious start of the pump. The cable damage could prevent stopping the pump from the control room.

Normally closed valve ENHV0012 could open due to damage to associated control cables. If this occurs coincident with a running Train B CS pump, water would flow from the containment spray nozzles, depleting inventory in the RWST.

The total flow in the containment spray system during injection phase with one pump operating is 3,165 gpm (M-10EN). Based on calculation XX-E-013, Appendix 1, a maximum of 214,260 gallons of water can be lost from the RWST to maintain sufficient volume to achieve cold shutdown.

As stated previously, level indication in the RWST is available, so operators would quickly diagnose a reducing RWST inventory. The time available to mitigate containment spray is:

214,260 gallons / 3,165 gpm = 67 minutes

Based on the above discussion, there is 67 minutes available to mitigate containment spray. Pump PEN01B can be stopped by opening breaker NB0203 in area C-10. This is an OMA. Refer to E-1F9900 for details. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 16.

References: XX-E-013, E-15000, E-13EN01, E-13EN03, E-1F9433, M-10EN, M-12EN01

5.2.25 Safety Injection Accumulator Isolation Valves

PFSSD requires isolation of the SI accumulators prior to reducing RCS pressure below the injection pressure to avoid unnecessary accumulator discharge. This is accomplished by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. These valves are normally open with the MCC breaker administratively locked in the open position.

Cables for valves EPHV8808B and EPHV8808D are run in area C-23. Since the breakers for these valves are normally open, damage to these cables will not cause the valves to spuriously change position. However, damage to the cables will prevent closing the associated valve from the control room after power is restored.

The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig. If necessary, a containment entry can be made to manually close the valves.

References: E-15000, XX-E-013, E-13EP02A, E-1F9201, M-12EP01, CKL EP-120

5.2.26 RCS Hot and Cold Leg Temperature Indication

PFSSD requires RCS hot and cold leg temperature indication on at least one loop to verify flow through the steam generators. The temperature elements and control room indicators used for this purpose are listed in the following table.

RCS Hot and Cold Leg Temperature Elements/Indicators Used for PFSSD		
ELEMENT	**INDICATOR**	**FUNCTION**
BBTE0413A	BBTI0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	BBTI0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	BBTR0423	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	BBTI0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	BBTR0433	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	BBTR0433	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	BBTR0443	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	BBTR0433	RCS Cold Leg Temperature Element (WR) Loop 4

Cable 16RLY01EA supplies 120 VAC power to control room panel RL021/RL022. At RL021/RL022, the power is split and supplies power to BBTR0433 and BBTR0443, as well as other non-PFSSD components. Damage to this cable could disrupt power to BBTR0433 and BBTR0443. Consequently, loops 3 and 4 RCS temperature indication could be lost. However, RCS temperature indication on loops 1 and 2 remains available. Therefore, the PFSSD function is satisfied.

References: E-15000, XX-E-013, E-13BB15, E-13RL01, E-13RL06, E-1F9201, E-1F9421, M-12BB01

5.2.27 Control Room Air Conditioning

PFSSD requires control room air conditioning to be available to maintain a tenable control room environment. Cable 14GKG02BA supplies 480 VAC power to panel GK199C. Panel GK199C is the power and control panel for Train B control room A/C unit SGK04B. Damage to this cable will prevent operation of SGK04B.

Cables associated with control room A/C unit SGK04B supply and return dampers GKHZ0040A and GKHZ0040B are run in this area. Damage to these cables could prevent operation of the dampers.

The Train A control room A/C unit is unaffected by a fire in this area. Therefore, control room air conditioning is available if a fire occurs in area C-23.

References: XX-E-013, E-15000, E-13GK02A, E-13GK02C, E-13GK02D, E-1F9442, M-12GK01

5.2.28 Class 1E Electrical Equipment Room Air Conditioning

Class 1E electrical equipment room air conditioning is required to satisfy the PFSSD support function of maintaining cooling within the Class 1E electrical equipment rooms.

Cables 14GKG13BG, 14GKG13BK and 14GKG13BM associated with Train B Class 1E electrical equipment room A/C unit SGK05B are run in area C-23. Damage to these cables could prevent operation of the unit.

Cable 14SAZ20HA provides a control power signal from panel GK196C to status panel SA066B to monitor SGK05B control power. Damage to this cable could prevent operation of SGK05B.

Power and control cables associated with Train A Class 1E electrical equipment room A/C unit SGK05A are unaffected by a fire in this area. However, cables associated with the fire detection alarm panel that initiates shutdown of SGK05A are run in fire area C-23. Cables 16KCQ21EA, 16KCQ21FA and 16KCQ21JA run from the main fire alarm panel (KC275) to Halon releasing panel KC230, located on the 2016 elevation of the control building in fire area C-35. Panel KC275 monitors smoke detectors in Halon protected switchboard rooms that are conditioned by SGK05A. Upon receipt of the proper detection sequence at KC275, a normally open auxiliary relay contact in KC275 closes and sends a short circuit signal over cables 16KCQ21FA or 16KCQ21JA to KC230. The short circuit signal received at KC230 initiates actuation of Halon in the affected room and shuts down SGK05A. If the cables are damaged in a fire and short circuit, Halon will be released into the Train A Class 1E electrical equipment rooms and class 1E A/C unit SGK05A will shut down.

Cable 16GKK31DB, associated with relay 95XGK08 runs in area C-23. If this cable is damaged, it could cause a spurious shutdown of both SGK05B.

If SGK05A spuriously shuts down or cannot be started, the spurious fire isolation signal can be bypassed by placing hand switch GKHS0101 in bypass position and the unit can be started using GKHIS0100. Hand switches GKHIS0100 and GKHS0101 are located on panel RP068 in the main control room.

References: XX-E-013, E-15000, E-13GK13, E-13GK13A, E-13GK31, E-13KC21, E-13SA20, E-1F9444, M-12GK03, M-655-00009, M-658-00042, M-658-00043, M-658-00044, M-622.1A-00002

5.2.29 Standby Diesel Generation

The PFSSD methodology requires at least one source of power to be available on the credited train. The standby diesel generators are credited whenever the fire could cause a loss of off-site power.

Several cables associated with the Train B diesel generator are run in this area. Also, cables associated with the Train B diesel generator room exhaust damper GMHZ0019 run in this area. Damage to these cables could prevent operation of the Train B diesel generator.

A fire in area C-23 credits Train A since the fire could cause a loss of several Train B components. Based on calculation XX-E-013, off-site power may not be available on both trains if a fire occurs in this area. The Train A emergency diesel generator is unaffected.

Based on the above discussion, only the Train A emergency diesel generator is available if a fire occurs in this area.

References: XX-E-013, E-15000, E-12KJ01, E-13GM01A, E-13GM04A, E-13JE01, E-13JE01A, E-13JE04, E-13KJ03A, E-13KJ07, E-13NE11, E-13NE13, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, E-1F9444, M-12GM01, M-12JE01

5.2.30 Containment Coolers

PFSSD requires containment cooling to maintain the containment environment within EQ limits. Cables associated with Train B containment coolers are run in area C-23. Damage to these cables could prevent operation of the Train B containment coolers. Circuits associated with Train A containment coolers are run in a separate fire area and are unaffected by a fire in area C-23.

As discussed earlier, Train A ESW is available if a fire occurs in area C-23. Therefore, the Train A containment coolers will have the necessary service water flow to ensure proper operation.

References: E-15000, XX-E-013, E-13GN02A, E-1F9441, M-12GN01

5.2.31 Class 1E 4.16 kV Offsite Power

Bus NB02 supplies power to Train B Engineered Safety Features (ESF) components. Cables associated with offsite power feeder breakers NB0209 and NB0212 are run in this area. In addition, cables associated with NB02 breaker control power are run in this area. Damage to these cables due to a fire could cause a loss of offsite power to NB02 and could prevent operation of the PFSSD equipment supplied by NB02. As stated in Section 5.2.15, the Train B emergency diesel generator may not be available if a fire occurs in this area.

Cables associated with transformers XNB01 and XNB02 lockout and phase differential relays are run in fire area C-23. Damage to these cables could cause a loss of offsite power on both trains.

Control cables associated with bus NB02 Synchro-scope and associated switches are run in area C-23. Damage to these cables could prevent some of the monitoring functions for NB02 but would not cause a loss of the NB02 bus.

As stated in Section 5.2.29, Train A emergency diesel generator is available and can be lined up to NB01 to provide power to Train A PFSSD loads. Therefore, a loss of offsite power on both trains due to a fire in area C-23 will not impact the ability to achieve and maintain safe shutdown. For a more detailed evaluation of offsite power availability, refer to Calculation XX-E-013.

References: XX-E-013, E-15000, E-1F9425, E-1F9426, E-13NB03, E-13NB04, E-13NB05, E-13NB06, E-13NB10, E-13NB11, E-13NB14, E-13NB15, E-1F9102, E-1F9423, E-1F9425, E-1F9426

5.2.32 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

Cables 14NFK01CA and 14NFK01DA for one of the four UV relays on each bus are run in fire area C-23. Also, cables 14NFY01EA and 14NFY01FA associated with one of the four degraded voltage PTs on each bus are run in fire area C-23. Cables associated with the remaining three UV relays and PTs do not run in fire area C-23. Therefore, automatic functioning of the bus NB01 and NB02 emergency load shedder / sequencer is unaffected by a fire in area C-23 and a spurious start of the associated diesel generator due to a false undervoltage condition on two of the four circuits is not credible.

Cable 14NFK01AA is a DC power cable that runs from NK5412 to NF039C. Damage to this cable could prevent an auto start of the Train B emergency diesel generator upon degraded voltage on 2/4 Train B undervoltage relays or 2/4 input of Train B degraded voltage PTs.

Separation group 4 power cables 14NFY01GA and 14NFY01HA associated with NF039A, NF039B and NF039C are run in this area. Separation groups 1, 2 and 3 power cables associated with these panels are unaffected. Therefore, power to the load shedder/sequencer panels is available.

Based on the above discussion, the Train A and B load shedder/sequencers are available if a fire occurs in this area but the Train B emergency diesel generator may be affected.

References: XX-E-013, E-15000, E-11NB01, E-11NB02, E-12NF01, E-13NF01, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, E-1F9402A, E-1F9402B, E-1F9403, E-1F9425, E-1F9426

5.2.33 Train B 480 Volt Class 1E Load Centers

Train B 480 Volt Class 1E Load Centers are required for PFSSD to ensure power is available to supply PFSSD loads.

Cables associated with Train B 480 VAC Class 1E load centers NG02, NG04 and motor control center (MCC) NG06E are run in area C-23. In addition, as stated in other sections, loss of power to these load centers could occur due to loss of Train B off-site and on-site power. Therefore, Train B load centers and associated equipment may not be available if a fire occurs in this area.

Cable 14PKK11AA is associated with 480 VAC breaker NG0409. NG0409 supplies 480 VAC power to Train B 125 VDC battery charger PK22, which energizes the PK02 bus. Damage to this cable could disable power to the battery charger but will not de-energize PK02 due to the installed batteries. Battery set PK12 will maintain 125 VDC power to PK02. In addition, NG0102 is unaffected and will continue to supply power to Train A 125 VDC battery charger PK21.

Redundant Train A components, supplied by NG01, NG03 and NG05E are unaffected by a fire in area C-23. Therefore, loss of power to Train B 480 VAC Class 1E load centers NG02, NG04 and MCC NG06E will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11NG02, E-13NG01A, E-13NG10A, E-13NG11A, E-13NG11B, E-13PK11, E-K3NG10A, E-1F9411B, E-1F9412B, E-1F9422C, E-1F9423, E-1F9424A. E-1F9424B, E-1F9424C, E-1F9424D

5.2.34 Class 1E 125 VDC Distribution System

The Class 1E 125 VDC electrical distribution system is required to supply power and control to required PFSSD equipment. The Class 1E 125 VDC system is supplied by the Class 1E 480 VAC system which is inverted to 125 VDC. In addition, backup batteries are installed to ensure continued uninterrupted power to the Class 1E 125 VDC buses. As stated previously, Train B Class 1E 480 VAC power could be affected by a fire in this area. However, the battery sets are unaffected and will supply 125 VDC power to the Train B components for approximately 4 hours. The Train A Class 1E 125 VDC system is unaffected.

Power cables associated with the Class 1E 125 VDC electrical distribution system are run in area C-23. These cables supply 125 VDC power to various PFSSD loads. The cables and supplied PFSSD equipment are summarized in the following table.

CABLE	NK BREAKER	CONTROL PANEL	PFSSD Components
14RLK01AA	NK04407	RL001/002	BGHV8153B, BGHV8154B
14RLK01BA	NK04409	RL005/006	FCFY0310
14RLK01CA	NK04412	RL017/018	EMHV8843, EMHV8871
14RLK01DA	NK04413	RL019/020	EGTV0030, GMHY0019
14RLK01EA	NK04414	RL021/022	BBHV8001B, BBHV8002B
14RLK01FA	NK04411	RL023/024	BMHV0001, BMHV0002, BMHV0003, BMHV0004

Damage to these cables could cause a loss of power to the associated components.

Valves BGHV8153B and BGHV8154B are isolation valves on the inlet side of the excess letdown heat exchanger. Loss of power to these valves will fail them closed, which is the desired PFSSD position.

Solenoid valve FCFY0310 is for TDAFP steam trap isolation valve FCFV0310. Loss of power to this solenoid valve will fail FCFV0310 closed, which is the desired PFSSD position.

Valves EMHV8843 and EMHV8871 are SI test line isolation valves on the BIT injection flow path. Loss of power to these valves will fail them closed, which is the desired PFSSD position.

Valve EGTV0030 is the Train B CCW temperature control valve. Loss of power to this valve will fail the valve closed and will provide the maximum cooling to the Train B components. This will not adversely impact PFSSD. In addition, Train A CCW is unaffected by the fire.

Solenoid valve GMHY0019 is for Train B emergency diesel generator exhaust damper actuator GMHZ0019. Loss of power to GMHY0019 will fail the exhaust damper open, which is the desired PFSSD position.

Valves BBHV8001B and BBHV8002B are reactor head vent isolation valves. Loss of power to these valves will fail them closed, which is the desired PFSSD position.

Valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 are steam generator blowdown valves. Loss of power to these valves will fail them closed, which is the desired PFSSD position.

Based on the above discussion, loss of power to the Train B Class 1E 125 VDC system as well as the components listed will have no adverse impact on PFSSD since the components fail in the desired PFSSD position and/or Train A Class 1E 125 VDC system is available.

References: XX-E-013, E-15000, E-13BB30, E-13BG48, E-13BM06A, E-13EG16, E-13EM04, E-13EM04A, E-13FC21, E-13GM04A, E-13RL01, E-13RL02, E-13RL03, E-13RL04, E-13RL05, E-13RL06, E-13RL07, E-1F9101, E-1F9202, E-1F9301, E-1F9302, E-1F9401A, E-1F9422B, E-1F9444, M-12BB04, M-12BG01, M-12BM01, M-12EG02, M-12EM01, M-12EM02, M-12FC02, M-12GM01

5.2.35 BOP Instrument Racks

BOP instrument racks RP053A, RP053B, RP053D and RP147 are credited in the PFSSD analysis. The following table identifies the PFSSD components served by each instrument rack.

Instrument Rack	PFSSD Components
RP053A (RP053AA, RP053AB, RP053AC)	ALHV0009, ALHV0011 ALPY0037A, EGFT0128, EGPSL0077, GDTSL0001, JELSL0001C
RP053B (RP053BA, RP053BB, RP053BC)	ALHV0007, ALPY0039A, EGFT0129, EGPSL0078, GDTSL0011, JELSL0021C
RP053D (RP053DA, RP053DB)	ALPY0038A
RP147 (RP147A, RP147B)	ALHV0005

Cables 14RPY09BA and 14RPY09CA supply 120 VAC power to BOP instrument rack RP053B. Damage to these cables could cause a loss of function of panel RP053B and associated PFSSD components.

A loss of PFSSD components controlled by RP053B will not adversely impact PFSSD as discussed below. A loss of valve ALHV0007 will prevent the Train B MDAFP from feeding steam generator A, however the TDAFP is available to feed steam generator A. ALPY0039A is associated with pressure transmitter ALPT0039 which is part of the 2/3 ESFAS Low Suction Pressure (LSP) signal logic. A LSP signal on 2 out of 3 pressure transmitters swaps the AFW source from CST to ESW. The remaining two pressure transmitters are unaffected so loss of ALPY0039A will have no adverse impact on PFSSD.

EGFT0129 is a flow transmitter on the CCW to RCP line and provides operators with the total CCW flow to the RCPs, including the thermal barriers. Flow transmitter EGFT0128 is unaffected and can be used by operators to determine if CCW is flowing to the thermal barriers.

EGPSL0078 is associated with the Train B CCW pump. A low-pressure signal on EGPT0078 will start the second CCW pump on Train B. Since Train A CCW is credited for a fire in this area, loss of this component will have no adverse impact on PFSSD.

GDTSL0011 is the low temperature switch for the Train B ESW pump room supply fan. Loss of this component will have no adverse impact since Train A ESW is unaffected by a fire in this area.

JELSL0021C is the level switch for Train B EDG day tank. Loss of this component will have no adverse impact since Train A EDG is unaffected by the fire.

Based on the above discussion, a loss of power to RP053B will have no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-13AL08, E-13AL09, E-13EG13, E-13EG19, E-13JE01, E-13NN01, E-13RP09, E-1F9101, E-1F9202, E-1F9204, E-1F9401B, E-1F9411B, E-1F9411A, E-1F9424D, E-1F9443, E-K3GD01A, E-K3GD04, M-12AL01, M-12EG01, M-12JE01, M-K2GD01

5.2.36 Control Room Lockout Relays

Control room lockout relays are used in the event of a fire in the control room to isolate certain PFSSD components from the effects of a control room fire. This is done to ensure the equipment remains functional from the auxiliary shutdown panel.

Cables associated with control room lockout relays 86XRP5, 86XRP6 and 86XRP7 are run in area C-23. Equipment controlled by the relays is identified in the table below.

Panel RP335 PFSSD Relays	
Relay #	**Description**
86XRP5	Train B MDAFP from CST and ESW Supply Valves (ALHV0034 and ALHV0030)
86XRP6	ESW to TDAFP Supply Valve (ALHV0033)
86XRP7	Train B MDAFP (PAL01B)

Damage to these cables could prevent operation of associated equipment. This equipment is associated with the Train B auxiliary feedwater system. Train A auxiliary feedwater equipment is available and unaffected by a fire in this area.

Based on the above discussion, damage to cables associated with control room lockout relays 86XRP5, 86XRP6 and 86XRP7 will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-13AL01B, E-13AL02B, E-13AL04B, E-13RP12, E-13RP14, E-13RP15, E-093-00095, E-093-00096, E-1F9202, E-1F9204

5.2.37 Reactor Protection System

The Reactor Protection System (RPS) monitors specified input parameters and initiates reactor protection features whenever those parameters are outside specified limits. Field installed transmitters continuously monitor various parameters and report the results to one of four process cabinets, one per channel. Signals are then sent from the process cabinets to both solid state protection cabinets, one on each train. The cabinets and associated channel are listed in the following table:

Process Cabinets	Solid State Protection Cabinets
Cabinet SB038 - Channel 1 Cabinet SB042 - Channel 2 Cabinet SB037 - Channel 3 Cabinet SB041 - Channel 4	Cabinet SB029A - Train A Input Cabinet Cabinet SB029B - Train A Logic Cabinet Cabinet SB029C - Train A Output Cabinet 1 Cabinet SB029D - Train A Output Cabinet 2 Cabinet SB032A - Train B Input Cabinet Cabinet SB032B - Train B Logic Cabinet Cabinet SB032C - Train B Output Cabinet 1 Cabinet SB032D - Train B Output Cabinet 2

The RPS is actuated upon 2/3 or 2/4 coincident logic, depending on the input parameter. This ensures that a loss of a single channel will not prevent the system from performing its function. Loss of power to a single cabinet will render the channel or Train inoperative.

Cables associated with RPS channel 4 run through this area. These cables supply power from separation group 4 power supplies to panels SB029A, SB032A, SB032D and SB041. Power cables associated with RPS channels 1, 2 and 3 are run in a separate fire area.

Based on the above discussion, the reactor protection system is available if a fire occurs in this area.

References: XX-E-013, E-15000, E-11NK02, E-13NN01, E-13SB01, E-13SB02, E-13SB05, E-13SB08A, E-13SB08D, E-13SB09, E-1F9102, E-1F9103, E-1F9203, E-1F9205, E-1F9421, E-1F9433, E-1F9431, E-1F9432, M-761-000167

5.2.38 Reactor Trip Switchgear

The reactor trip switchgear is required to ensure the ability to manually trip the reactor. The reactor is tripped using either hand switch SBHS0001 or SBHS0042 in the main control room. Each hand switch has contacts associated with Train A reactor trip switchgear SB102A and Train B reactor trip switchgear SB102B.

Cable 14SBS10BB supplies 125 VDC power to Train B reactor trip switchgear cabinet SB102B. Loss of 125 VDC power will prevent operation of the Train B reactor trip functions but redundant Train A reactor trip switchgear cabinet SB102A remains available. Therefore, loss of 125 VDC power will not impact PFSSD.

Cable 14SBS12BC, associated with separation group 4 trip circuits, is run in area C-23. A hot short in this cable could cause a spurious reactor trip, which is the desired PFSSD condition. An open circuit will prevent a manual reactor trip on Train B reactor trip switchgear SB102B.

Cables associated with separation group 1 trip circuits are unaffected by a fire in area C-23. Therefore, operation of either hand switch SBHS0001 or SBHS0042 will cause a reactor trip on redundant Train A reactor trip switchgear SB102A.

References: XX-E-013, E-15000, E-13SB12A, E-1F9101

5.2.39 Process Monitoring Instrumentation

Process instrumentation is required for PFSSD to provide operators with reliable diagnostic instrumentation of process variables. Circuits for a number of process instruments are run in area C-23. These circuits run from various process monitoring panels to the auxiliary shutdown panel (ASP) and provide indication at the ASP for control outside the control room.

Damage to these cables will not cause a loss of process monitoring capability in the main control room. Therefore, damage to these cables due to a fire in area C-23 will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13SB16, E-1F9201, E-1F9301, M-12BB01, M-12BB02, M-12BB04

5.2.40 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available to provide indication of cold shutdown reactivity conditions. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B.

Cable 14SES07BA is a power cable associated with SR monitor signal processor SENY0061B. Cable 14SES07CA is a power cable associated with SR monitor amplifier SENY0061A. Damage to these cables could prevent operation of the associated source range monitor.

Source Range monitoring remains available for a fire in area C-23 using SENE0031, SENE0032 and SENY0060A/B.

For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013, Attachment 3.

References: E-15000, XX-E-013, E-13SE07, E-1F9101

5.2.41 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs.

One control cable associated with reactor coolant pumps C and D is run in fire area C-23. Damage to these cables in the event of a fire could prevent operators from stopping the C and D RCPs from the control room. However, a fire in C-23 will not cause a loss of all seal cooling since RCP seal injection and thermal barrier cooling remain available.

Based on the above discussion, the inability to trip the C and D RCPs from the control room will have no adverse impact on PFSSD. The pumps can continue to operate, providing forced flow circulation. If the pumps spuriously stop, natural circulation cooldown can be used.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1

5.2.42 Steam Generator Feedwater Pumps

Main feedwater pump steam supply valves FCFV0005 and FCFV0105 are credited in the PFSSD analysis to trip the main feedwater pumps if the main steam isolation valves (MSIVs) are affected by a fire. Closing the MSIVs stops steam flow to the feedwater pumps' turbines and stops the feedwater pumps. The steam generator feedwater pumps are tripped in the event of a fire to prevent overfilling the steam generators.

Non-Class 1E 120 VAC Inverter PN10 and distribution panel PN10A provide power to FCFV0105 trip relays in panel FC170C. Cable 16FCY35AA provides the primary source of 120 VAC power from distribution panel PN010A to panel FC170A. The alternate source of power to panel FC170A is not credited for PFSSD and is assumed lost.

A fire in area C-23 could damage cable 16FCY35AA. If this occurs, operators in the control room would not be able to close valve FCFV0105 to stop steam flow to steam generator feedwater pump PAE01B.

A fire in area C-23 will not affect the ability to close the MSIVs from the control room. All-close hand switch ABHS0080 is unaffected and can be used to close the MSIVs from the control room.

Based on the above discussion, valve FCFV0105 may not close if a fire occurs in this area. However, the MSIVs can be closed using hand switch ABHS0080 in the main control room. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-13FC35, E-1F9103, E-1F9421

5.2.43 Load Center Feeder Breakers PA0206, PA0207 and Load Center PG20 Incoming Feeder Breaker PG2001

Load center feeder breakers PA0206, PA0207 and PG2001 are credited for PFSSD because they supply power to credited non-safety related loads. Cables associated with these breakers run in this area. PFSSD impact due to damage to these cables is discussed below.

Cable 16PGA10CA is a control cable associated with breaker PA0206 and runs in fire area C-23. An intra-cable hot short in this cable will trip PA0206. Breaker PA0206 supplies power to the following PFSSD components:

- PG12KAF4 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0032
- PG12KAF5 – Main Steam Supply to Steam Seals Valve ABHV0046
- PG12KEF3 – Auxiliary Steam System Control Valve FBHV0080

PG12KAF4, PG12KAF5 and PG12KEF3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using hand switch ABHS0080. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Cable 16PGA11AC, associated with PA0207, runs in this area. A fire induced short circuit in this cable will trip the breaker. Cable 16PGG13DA, associated with PG2001, runs in this area. Damage to this cable will trip the breaker.

Breakers PA0207 and PG2001 supply power to the following PFSSD components:

- PG20GBR217 – MCB Misc. Power Circuits RL023
- PG20GER5 – Instr. Bus Transformer Alt. Feed XPN08D

PFSSD components powered from PG20GBR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the

control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG20GER5 is credited as one source of power to PN08. The redundant source of power from NG02BBF1 could also be affected by a fire in this area as discussed in Section 5.2.36. Redundant components powered from inverter PN07 are unaffected by a fire in this area.

Based on the above discussion, loss of breakers PA0207 and PG2001 will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-11PK02, E-13PG10, E-13PG11, E-13PG13, E-13RL07, E-1F9421, E-1F9422C, E-1F9424E, KD-7496, DCP 13324

5.2.44 120 VAC Distribution Panel PN410

120 VAC distribution panel PN410 supplies power to NSSS control panels RP043 and RP047.

Inverter PN04 supplies power to 120 VAC distribution panel PN410 (via cables 16PNY02AA and 16PNY02AB), which in turn supplies redundant 120 VAC power to NSSS control cabinets RP043 and RP047. For PFSSD, cabinet RP043 houses relays BGLCV0459X and BGLCV0460X, which are associated with letdown isolation valves BGLCV0459 and BGLCV0460, respectively. Cabinet RP047 includes controls for pressurizer PORVs and pressurizer spray.

Damage to cables 16PNY02AA and/or 16PNY02AB will disrupt power to panel PN410. Redundant power to RP043 and RP047 is available from 120 VAC distribution panel PN310. Therefore, loss of power to PN410 will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-1F9421, DCP 13324

5.2.45 Normal Pressurizer Spray

The normal pressurizer spray valves are included in the PFSSD design because spurious operation of pressurizer sprays can cause a decrease in pressure which can lead to boiling in the core. The pressurizer spray valves are part of the pressurizer pressure control system.

The pressurizer normal spray valves (BBPCV0455B and BBPCV0455C) operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

Cable 14BBI16NB associated with BBPT0458 is run in this area. Damage to this cable could cause a spurious high-pressure signal. As discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure input channel will not cause the spurious operation of the pressurizer spray valves due to the Ovation 4-channel validation logic, which uses the 2nd highest signal as the validated signal and has built-in logic to detect and ignore a failed input.

Based on the above discussion, the pressurizer spray valves will not spuriously open if a fire occurs in this area.

References: E-15000, XX-E-013, E-13BB19, M-744-00028, DCP 13324

FIRE AREA C-24

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-24 is located on the 2032 elevation of the Control Building and includes the rooms listed in Table C-24-1.

Table C-24-1
Rooms Located in Fire Area C-24

ROOM #	DESCRIPTION
3504	North Electrical Chase - 2032 Elevation

Fire area C-24 is protected with an automatic wet-pipe sprinkler system and automatic fire detection. The area is separated from adjacent areas by minimum 3-hour fire resistant construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-24-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-24-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-24

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Steam generator A ARV control may be lost. Steam generator ARVs B, C and D are unaffected. Cooldown is assured using Aux Feedwater Pump B supplying steam generator D and the Turbine Driven Auxiliary Feedwater Pump supplying steam generators B and C. ABHS0080 may not be available to close the MSIVs and MSIV bypass valves. ABHS0079 is available to close the MSIVs and MSIV bypass valves.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-24.
AE	Main Feedwater	H, P	All PFSSD functions associated with the main feedwater system are satisfied. Steam generator (SG) level indication is available on SG A using narrow range level transmitters AELT0517, AELT0518 and AELT0519. Steam generator level indication is available on SG D using wide range level transmitter AELT0504 and narrow range level transmitters AELT0547, AELT0548 and AELT0549. Isolate all four main feedwater isolation valves using handswitch AEHS0081.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. Train B MDAFP is available to supply SGs A and D, however SG A ARV ABPV0001 could spuriously open and may need to be failed closed. The TDAFP is available to supply SGs B and C. Pressure transmitter/indicator ALPT0037/ALPI0037 may be affected. Auxiliary feedwater suction pressure indication is available using pressure transmitters/indicators ALPT0038/ALPI0038A and ALPT0039/ALPI0039A.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-24.

Table C-24-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-24

System	System Name	PFSSD Function*	Comments
BB	Reactor Coolant System	R, M, H, P, S	Pressurizer PORV BBPCV0455A may open and block valve BBHV8000A may not close. If this occurs, Operators can close the PORV by placing BBHIS0455A in the CLOSE position. RCS pressure transmitter BBPT0405 could be affected. RCS pressure indication is available using BBPI0406. Pressurizer level transmitter BBLT0459 could be affected. Pressurizer level indication is available using BBLI0460A. Pressurizer pressure transmitter BBPT0455 could be affected. Pressurizer pressure transmitters BBPT0456, BBPT0457 and BBPT0458 are unaffected. Therefore, pressurizer pressure indication is available using BBPI0456, BBPI0457 and BBPI0458. Reactor head vent valve BBHV8001A could spuriously open. Loss of inventory through the head vent valves is prevented by maintaining valve BBHV8002A closed and either BBHV8001B or BBHV8002B closed. RCS Loop 1 Wide Range Cold Leg Temperature Element BBTE413B and RCS Loop 4 Wide Range Hot Leg Temperature Element BBTE443A are available. RCP thermal barrier cooling could be affected due to spurious closure of BBHV0013, BBHV0014, BBHV0015 and BBHV0016. Reactor coolant pumps A and B may not stop using the control room hand switch. RCP seal injection remains available. Therefore, the inability to stop the RCPs will have no adverse impact on PFSSD. Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, pressurizer spray can be stopped by closing KAFV0029 using KAHIS0029 in the main control room.
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. Train B Centrifugal Charging Pump (CCP) is available to provide charging flow from the RWST to the RCP seals through valve BGHV8357B. VCT level indicator BGLI0112 could be affected. Level indicator BGLI0185 should be used to determine VCT level. Normal charging is isolated using BGHIS8105 to close valve BGHV8105. Cables for valve BGHV8106 could be damaged. Valve BGHV8153A and either BGHV8153B or BGHV8154B are maintained closed to isolate excess letdown. Letdown isolation valves BGLCV0459 and BGLCV0460 and letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C may need to be failed closed by closing valve KAFV0029 using KAHIS0029 in the main control room. RCP seal flow indication is available using BGFI0215B. RCP seal flow indicator BGFI0215A may be affected.

Table C-24-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-24

System	System Name	PFSSD Function*	Comments
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blowdown system are satisfied. Steam generator blowdown is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A, located on the RL024 panel in the main control room.
BN	Borated Refueling Water Storage System	R, M, H	The RWST is available to provide a suction source to Centrifugal Charging Pump B via valve BNLCV0112E. RWST level indication is available using BNLI0931, BNLI0932 and BNLI0933.
EF	Essential Service Water System	H, S	All PFSSD functions associated with the essential service water system are satisfied. Train A ESW is unavailable due to damage to a number of associated components. Train B ESW is unaffected.
EG	Component Cooling Water System	S	All PFSSD functions associated with the component cooling water system are satisfied. A number of Train A CCW system components could be affected. The Train B CCW system is unaffected. CCW flow to the RCP thermal barriers could be affected as discussed in BB System comments above. CCW to RCP flow indicator EGFI0128 could be affected. CCW to RCP flow indicator EGFI0129 is unaffected. Valve EGHV0101 could be affected, preventing operation of Train A RHR. Valve EGHV0102 is unaffected.
EJ	Residual Heat Removal System	M, H, P	A number of Train A RHR components may be affected. The Train B RHR pump is unaffected but valve EJHV8701B may need to be manually opened or a cold shutdown repair made when aligning Train B RHR for shutdown cooling. The Train A RHR system could be affected. The Train B RHR system is unaffected.
EM	High Pressure Coolant Injection	R, M	All PFSSD functions associated with the high-pressure coolant injection system are satisfied. BIT inlet valve EMHV8803A may be affected but valves EMHV8801A, EMHV8801B and EMHV8803B are available to ensure an available BIT flowpath using Train B CCP. The Train A SI Pump may spuriously start but the spurious actuation will not adversely impact PFSSD since the pump will be dead headed against RCS pressure. Therefore, no inventory will be lost from the RWST. In this condition, the pump could experience cavitation damage, but this is a commercial concern, not a PFSSD concern. Operators can disconnect power to the pump by opening breaker NB0103, but this action is not required for PFSSD. SI test line valves EMHV8882 and EMHV8964 could be affected. The SI test line can be isolated by closing valve EMHV8871.
EN	Containment Spray	R, M	Containment spray pump PEN01A could spuriously start and valve ENHV0006 could open, causing flow to the containment spray nozzles. Pump PEN01A can be stopped by opening breaker NB0102 in area C-9.

Table C-24-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-24

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	A containment entry may be required to close SI Accumulator injection valves EPHV8808A and EPHV8808C if these valves are unresponsive from the control room. The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-24.
FC	Auxiliary Turbines	R, H, P	Valve FCFV0005 may be affected. The MSIVs can be closed using all-close hand switch ABHS0079.
GD	ESW Pump House HVAC	S	Train A ESW pump room ventilation system could be affected. Train B ESW pump room ventilation system is unaffected.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-24.
GK	Control Room and Class 1E Switchgear Room Coolers	S	Train A control room A/C unit SGK04A may be affected. Train B control room A/C unit SGK04B is unaffected. Train A Class 1E electrical equipment room A/C unit SGK05A may be affected. Train B Class 1E electrical equipment room A/C unit SGK05B is unaffected.
GL	Auxiliary Building HVAC	S	Train A CCW pump room cooler SGL11A could be affected. Train B CCW pump room cooler SGL11B is unaffected.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-24.
GN	Containment Coolers	S	Containment pressure transmitter GNPT0937 could be affected. Containment pressure transmitters GNPT0934, GNPT0935 and GNPT0936 are unaffected. Train A containment cooler fans SGN01A and SGN01C could be affected. Train B containment cooler fans SGN01B and SGN01D are unaffected.
JE	Diesel Fuel Oil	S	Low standpipe level switch JELSL0001C may be affected due to loss of power to RP053AC. This could prevent operation of the Train A diesel fuel oil transfer pump PJE01A on low standpipe level. The Train B diesel fuel oil transfer pump PJE01B is unaffected by a fire in this area.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-24.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-24.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-24.
KJ	Standby Diesel Engine	S	Train A diesel engine may be affected by a fire in this area. Train B diesel engine is unaffected.

Table C-24-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-24

System	System Name	PFSSD Function*	Comments
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-24.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-24.
NB	4.16 kV System	S	Train A Class 1E 4.16 kV switchgear bus NB01 may be affected. Train B Class 1E 4.16 kV switchgear bus NB02 is unaffected.
NE	Standby Diesel Generator	S	Train A diesel generator may be affected by a fire in this area. Train B diesel generator is unaffected.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function associated with the load shed/emergency load sequencing system is satisfied. Cables associated with one of the four undervoltage relays and degraded voltage potential transformers on Train A are run in area C-24. Cables associated with one of the four undervoltage relays and degraded voltage potential transformers on Train B are run in area C-24. Emergency load shed/sequencer operates when 2/4 UV relays sense undervoltage on the bus. Therefore, Trains A and B Load Shed and Emergency Load Sequencing will be available.
NG	480V Load Centers and MCCs	S	Loss of power to NB01 will result in a loss of power to Train A 480 V load centers and MCCs. Redundant Train B 480 V load centers and MCCs are unaffected.
NK	125VDC	S	Train A class 1E 125 VDC power could be disrupted to control room panels RL001/RL002, RL005/RL006, RL017/RL018, RL019/RL020 and RL021/RL022. Train B class 1E 125 VDC power is unaffected.
NN	120VAC	S	Train A class 1E 120 VAC power could be disrupted to control room panels RP053AC, SA036A, SB029A, SB029D, SB032A, SB038, and SE054A. Train B class 1E 120 VAC power is unaffected.
PA	13.8kV	S	Breakers PA0105 and PA0106 could be affected by a fire in this area. Redundant capability is available.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-24.
PG	480V Load Centers and MCCs	S	Loss of all power on bus NB01 will result in Separation Group 5 PG busses losing power. Off-site and on-site power to NB02 and Separation Group 6 PG busses are unaffected. Breaker PG1901 could be affected. Redundant capability is available.
PK	125VDC	S	Battery charger PK21 could be affected. Battery charger PK22 is unaffected.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-24.

Table C-24-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-24

System	System Name	PFSSD Function*	Comments
PN	120VAC	S	Power to non-class 1E 120 VAC switchboard PN07 may be affected. Non-class 1E 120 VAC switchboard PN08 is unaffected.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-24.
QD	Emergency Lighting	S	The 125 VDC emergency lights in the control room could be affected. Self-contained battery powered lighting units are available to provide lighting in the control room.
RL	Control Room MCB	S	Train A class 1E 125 VDC power could be disrupted to control room panels RL001/RL002, RL005/RL006, RL017/RL018, RL019/RL020 and RL021/RL022. Train B class 1E 125 VDC power is unaffected. Separation group 5 non class 1E 125 VDC power could be disrupted to control room panels RL001/RL002, RL013/RL014 and RL017/RL018. Separation group 5 non class 1E 120 VAC power could be disrupted to control room panels RL017/RL018, RL021/RL022 and RL023/RL024. Separation group 6 non class 1E 125 VDC power and non-class 1E 120 VAC power remains available.
RP	Miscellaneous Control Panels	R, M, H, P, S	Train A components and cables associated with this system could be affected. Train B components and cables associated with this system are unaffected. Power to panel RP043 could be affected. See SC system discussion for details. 120 VAC power to panel RP053A could be affected. Power to panels RP053B, RP053D and RP147 is unaffected. The Train A PFSSD functions associated with panels RP060, RP068, RP211 and RP330 could be affected. Redundant capability exists and is unaffected by a fire in this area.
SA	ESFAS	S	Auxiliary feedwater low suction pressure (LSP) signal monitored by panel SA036A could be affected. Auxiliary feedwater LSP signals monitored by panels SA036B and SA036C are unaffected. Status indication of Train A class 1E electrical equipment room A/C unit SGK05A at status panel SA066A could be affected. Status indication of control room A/C unit SGK04A and associated dampers GKHZ0029A and GKHZ0029B could be affected. Status indication of redundant Train B components is unaffected.
SB	Reactor Protection System	R, S	A loss of power to input channel 1 in SB029A and SB032A could occur. Input channels 2, 3 and 4 remain available. Train A output cabinet 2 (SB029D) could lose power. Train A reactor trip switchgear SB0102A could be affected such that a reactor trip occurs or a manual trip on Train A is prevented. Train B output cabinets and Train B reactor trip switchgear cabinet are unaffected.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-24.

Table C-24-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-24

System	System Name	PFSSD Function*	Comments
SE	Ex-Core Neutron Monitoring	R, P	Source range monitor SENE0031, SR monitor signal processor SENY0060B could be affected. Source range monitoring remains available using SENE0032 and SENY0061A/B.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-24.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-24.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-24. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs

It may be necessary to fail close ABPV0001 by isolating air and nitrogen to the valve using KAV1435 (air) and KAV1364 (Nitrogen) then venting air from the regulator. These valves are located in area A-23 and emergency lighting is available.

3.1.2 **Containment Spray** (OMA, refer to E-1F9900)

Containment spray pump PEN01A could spuriously start and valve ENHV0006 could open, causing containment spray. The pump can be stopped by opening breaker NB0102 in area C-9.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Main Steam Isolation Valves and MSIV Bypass Valves

The capability to isolate the MSIVs and bypass valves using handswitch ABHS0080 may be affected. The MSIVs and bypass valves can be isolated using handswitch ABHS0079.

3.2.2 Main Feedwater Isolation Valves

The capability to isolate the MFIVs using handswitch AEHS0080 may be affected. Isolate the MFIVs using handswitch AEHS0081.

3.2.3 Auxiliary Feedwater

If steam generator A ARV ABPV0001 control is lost, use the Turbine Driven Auxiliary Feedwater Pump (TDAFP) to supply steam generators B and C and control steam release using ARVs ABPV0002 and ABPV0003. Alternatively, the Train B Motor Driven Auxiliary Feedwater Pump (MDAFP) is available to supply steam generator D in conjunction with the TDAFP feeding either SG B or SG C.

3.2.4 Component Cooling Water

Train A CCW could be affected by a fire in this area. If this occurs, swap to Train B CCW using normal operating procedures if Train B CCW is not already running. Loss of CCW flow to the RCP thermal barriers can be diagnosed using flow indicator EGFI0129 on panel RL020.

3.2.5 Reactor Coolant Pump Seal Cooling

Thermal barrier cooling could be affected. RCP seal injection could temporarily be disrupted until the Train B CCP is lined up. The Train B CCP can be started and lined up from the control room. RCP seal flow indication is available using BGFI0215B.

3.2.6 Pressurizer PORV/Block Valve

Pressurizer PORV BBPCV0455A could spuriously open and block valve BBHV8000A may not close. If this occurs, Operators can close the PORV by placing BBHIS0455A in the CLOSE position. Pressurizer pressure indication is available using BBPI0456, BBPI0457 and BBPI0458 located on RL002.

3.2.7 Normal Pressurizer Spray

Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, the spray can be stopped by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer pressure indication is available using BBPI0456, BBPI0457 and BBPI0458.

3.2.8 Isolation of Letdown

A fire in area C-24 could prevent valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B, and BGHV8149C from being closed using their associated control room hand switches. If this occurs, the valves can be closed by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer level indication is available using BBLI0460A.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 Safety Injection Accumulators

A containment entry may be required to close SI Accumulator injection valves EPHV8808A and EPHV8808C if these valves are unresponsive from the control room. The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig.

3.3.2 Residual Heat Removal

Valve EJHV8701B may need to be manually opened or a cold shutdown repair made when aligning Train B RHR for shutdown cooling.

4.0 CONCLUSION

With some exceptions, redundant Post Fire Safe Shutdown capability exists if a severe fire occurs in area C-24. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-24.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-24

There are no PFSSD components located in area C-24. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-24-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-24. The applicable evaluation section is also listed in Table C-24-3.

Table C-24-3
PFSSD Cables Located in Fire Area C-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ABI20EA	3504	ABPT0001	I	5.2.1	SG A ARV ABPV0001 Pressure Transmitter
11ABI20EC	3504	ABPV0001	I	5.2.1	SG A ARV Press Controller at RP118A
11ABI20ED	3504	ABPV0001	I	5.2.1	SG A ARV Press Controller at RP118A
11ABI20EE	3504	ABPY0001	I	5.2.1	SG A ARV ABPV0001 I/P Converter
11ABI21JA	3504	ABPT0514	I	5.2.2	Steam Generator A Pressure Transmitter
11ABI21MA	3504	ABPT0524	I	5.2.2	Steam Generator B Pressure Transmitter
11ABI21RA	3504	ABPT0534	I	5.2.2	Steam Generator C Pressure Transmitter
11ABI21UA	3504	ABPT0544	I	5.2.2	Steam Generator D Pressure Transmitter
11ABK23AE	3504	ABHV0012, ABHV0015, ABHV0018, ABHV0021	C	5.2.3	MSIV Bypass Valves
11ABK23AF	3504	ABHS0080	C	5.2.3	MSIV and MSIV Bypass Valve Handswitch
11ABK23AG	3504	ABHV0012, ABHV0015, ABHV0018, ABHV0021	C	5.2.3	MSIV Bypass Valves
11ABK28AH	3504	ABHV0014	C	5.2.4	Loop 1 Main Steam Iso Valve
11ABK28BH	3504	ABHV0020	C	5.2.4	Loop 3 Main Steam Iso Valve
11ABK29AH	3504	ABHV0017	C	5.2.4	Loop 2 Main Steam Iso Valve
11ABK29BH	3504	ABHV0011	C	5.2.4	Loop 4 Main Steam Iso Valve
11ABK30BB	3504	SA075A	P	5.2.4 5.2.6	125 VDC to MSFIS Cabinet SA075A from NK5119
11AEI08AB	3504	AELT0501	I	5.2.5	SG A Wide Range Level Transmitter
11AEI08BB	3504	AELT0529	I	5.2.5	SG B Narrow Range Level Transmitter
11AEI08CB	3504	AELT0539	I	5.2.5	SG C Narrow Range Level Transmitter
11AEI12AB	3504	AELT0551	I	5.2.5	SG A Narrow Range Level Transmitter
11AEI12DB	3504	AELT0554	I	5.2.5	SG D Narrow Range Level Transmitter

Table C-24-3
PFSSD Cables Located in Fire Area C-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11AEK16AH	3504	AEFV0039	C	5.2.6	Steam Generator A Feedwater Isolation Valve
11AEK16BH	3504	AEFV0041	C	5.2.6	Steam Generator C Feedwater Isolation Valve
11AEK17AH	3504	AEFV0040	C	5.2.6	Steam Generator B Feedwater Isolation Valve
11AEK17BH	3504	AEFV0042	C	5.2.6	Steam Generator D Feedwater Isolation Valve
11ALB01AB	3504	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AD	3504	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AG	3504	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AR	3504	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AS	3504	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALB01AW	3504	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALG02BA	3504	ALHV0035	P	5.2.7	CST to MDAFP A Suction
11ALG02BB	3504	ALHV0035	C	5.2.7	CST to MDAFP A Suction
11ALG02BC	3504	ALHV0035	C	5.2.7	CST to MDAFP A Suction
11ALG02CA	3504	ALHV0036	P	5.2.7	CST to TDAFP Suction
11ALG02CB	3504	ALHV0036	C	5.2.7	CST to TDAFP Suction
11ALG02CC	3504	ALHV0036	C	5.2.7	CST to TDAFP Suction
11ALG04BA	3504	ALHV0031	P	5.2.7	ESW to MDAFP A Suction
11ALG04BB	3504	ALHV0031	C	5.2.7	ESW to MDAFP A Suction
11ALG04BC	3504	ALHV0031	C	5.2.7	ESW to MDAFP A Suction
11ALG04BD	3504	ALHV0031	C	5.2.7	ESW to MDAFP A Suction
11ALG04BE	3504	ALHV0031	C	5.2.7	ESW to MDAFP A Suction
11ALG04CA	3504	ALHV0032	P	5.2.7	ESW A to TDAFP Suction
11ALG04CB	3504	ALHV0032	C	5.2.7	ESW A to TDAFP Suction

Table C-24-3
PFSSD Cables Located in Fire Area C-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ALG04CC	3504	ALHV0032	C	5.2.7	ESW A to TDAFP Suction
11ALG04CD	3504	ALHV0032	C	5.2.7	ESW A to TDAFP Suction
11ALG04CE	3504	ALHV0032	C	5.2.7	ESW A to TDAFP Suction
11ALI03AC	3504	ALHV0009	I	5.2.7	MDAFP A to SG B
11ALI03AD	3504	ALHV0009	I	5.2.7	MDAFP A to SG B
11ALI03AE	3504	ALHV0009	I	5.2.7	MDAFP A to SG B
11ALI03AF	3504	ALHV0009	I	5.2.7	MDAFP A to SG B
11ALI03BC	3504	ALHV0011	I	5.2.7	MDAFP A to SG C
11ALI03BD	3504	ALHV0011	I	5.2.7	MDAFP A to SG C
11ALI03BE	3504	ALHV0011	I	5.2.7	MDAFP A to SG C
11ALI03BF	3504	ALHV0011	I	5.2.7	MDAFP A to SG C
11ALI05AC	3504	ALHV0006	I	5.2.7	TDAFP to SG D
11ALI05AD	3504	ALHV0006	I	5.2.7	TDAFP to SG D (ALHY0006)
11ALI05AE	3504	ALHV0006	I	5.2.7	TDAFP to SG D
11ALI05AF	3504	ALHV0006	I	5.2.7	TDAFP to SG D
11ALI05BC	3504	ALHV0008	I	5.2.7	TDAFP to SG A
11ALI05BD	3504	ALHV0008	I	5.2.7	TDAFP to SG A (ALHY0008)
11ALI05BE	3504	ALHV0008	I	5.2.7	TDAFP to SG A
11ALI05BF	3504	ALHV0008	I	5.2.7	TDAFP to SG A
11ALI07JA	3504	ALPT0025	I	5.2.7	MDAFP A Suction Pressure
11ALI08AA	3504	ALPT0037	I	5.2.7	ESFAS AFW Low Suction Press Transmitter
11ALI09BA	3504	ALFT0009	I	5.2.7	Aux Feedwater Flow to SG B
11ALI09CA	3504	ALFT0011	I	5.2.7	Aux Feedwater Flow to SG C

Table C-24-3
PFSSD Cables Located in Fire Area C-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ALK01AA	3504	DPAL01A	C	5.2.7	Auxiliary Feedwater Pump A Motor
11ALY09CD	3504	ALHV0009	C	5.2.7	MDAFP A to SG B
11ALY09DD	3504	ALHV0011	C	5.2.7	Train A MDAFP to SG C
11BBG03AA	3504	BBHV0013	P	5.2.20	RCP A Thermal Barrier Return Iso Valve
11BBG03AB	3504	BBHV0013	C	5.2.20	RCP A Thermal Barrier Return Iso Valve
11BBG03AC	3504	BBHV0013	C	5.2.20	RCP A Thermal Barrier Return Iso Valve
11BBG03AD	3504	BBHV0013	C	5.2.20	RCP A Thermal Barrier Return Iso Valve
11BBG03BA	3504	BBHV0014	P	5.2.20	RCP B Thermal Barrier Return Iso Valve
11BBG03BB	3504	BBHV0014	C	5.2.20	RCP B Thermal Barrier Return Iso Valve
11BBG03BC	3504	BBHV0014	C	5.2.20	RCP B Thermal Barrier Return Iso Valve
11BBG03BD	3504	BBHV0014	C	5.2.20	RCP B Thermal Barrier Return Iso Valve
11BBG03CA	3504	BBHV0015	P	5.2.20	RCP C Thermal Barrier Return Iso Valve
11BBG03CB	3504	BBHV0015	C	5.2.20	RCP C Thermal Barrier Return Iso Valve
11BBG03CC	3504	BBHV0015	C	5.2.20	RCP C Thermal Barrier Return Iso Valve
11BBG03CD	3504	BBHV0015	C	5.2.20	RCP C Thermal Barrier Return Iso Valve
11BBG03DA	3504	BBHV0016	P	5.2.20	RCP D Thermal Barrier Return Iso Valve
11BBG03DB	3504	BBHV0016	C	5.2.20	RCP D Thermal Barrier Return Iso Valve
11BBG03DC	3504	BBHV0016	C	5.2.20	RCP D Thermal Barrier Return Iso Valve
11BBG03DD	3504	BBHV0016	C	5.2.20	RCP D Thermal Barrier Return Iso Valve
11BBG39AC	3504	BBHV8000A	C	5.2.8	Pressure PORV BBPCV0455A Block Valve
11BBI15EB	3504	BBPT0405	I	5.2.9	RCS Wide Range Hot Leg Pressure
11BBI15HB	3504	BBTE0413A	I	5.2.10	RCS Loop 1 Hot Leg Temp (WR)
11BBI15JB	3504	BBTE0423A	I	5.2.10	RCS Loop 2 Hot Leg Temp (WR)

Table C-24-3
PFSSD Cables Located in Fire Area C-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BBI15KB	3504	BBTE0443B	I	5.2.10	RCS Loop 4 Cold Leg Temp (WR)
11BBI15LB	3504	BBTE0433B	I	5.2.10	RCS Loop 3 Cold Leg Temp (WR)
11BBI16KB	3504	BBPT0455	I	5.2.2 5.2.8 5.2.42	Pressurizer Pressure Transmitter
11BBI16PB	3504	BBLT0459	I	5.2.11	Pressurizer Level Transmitter (NR)
11BBI28AA	3504	BBFT0017	I	5.2.20	BBHV0013 Flow Control
11BBI28BA	3504	BBFT0018	I	5.2.20	BBHV0014 Flow Control
11BBI28CA	3504	BBFT0019	I	5.2.20	BBHV0015 Flow Control
11BBI28DA	3504	BBFT0020	I	5.2.20	BBHV0016 Flow Control
11BBK30AA	3504	BBHV8001A	C	5.2.12	RX Vessel Head Vent Solenoid Valve
11BBK40AK	3504	BBPCV0455A	C	5.2.8	Pressurizer PORV
11BBK40AM	3504	BBPCV0455A	C	5.2.8	Pressurizer PORV
11BBK40AN	3504	BBPCV0455A	P	5.2.8	Pressurizer PORV
11BGB01AB	3504	DPBG05A	C	5.2.13	Centrifugal Charging Pump A Motor
11BGG11BC	3504	BGHV8106	C	5.2.14	Charging Pumps To Regenerative HX Iso
11BGG11CC	3504	BGHV8110	C	5.2.13	CCP A Mini-Flow Valve
11BGG11CD	3504	BGHV8110	C	5.2.13	CCP A Mini-Flow Valve
11BGG12AC	3504	BGLCV0112B	C	5.2.15	VCT Outlet Valve
11BGG12AE	3504	BGLCV0112B	C	5.2.15	VCT Outlet Valve
11BGG52AC	3504	BGHV8357A	C	5.2.13	CCP A Discharge to RCP Seals
11BGI51AA	3504	BGFT0215A	I	5.2.13	RCP Seal Total Flow Transmitter
11BGI51CA	3504	BGLT0112	I	5.2.15	VCT Level Transmitter

Table C-24-3
PFSSD Cables Located in Fire Area C-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BGK48DB	3504	BGHV8154A	C	5.2.16	Excess Letdown Iso Valve
11BNG01AC	3504	BNLCV0112D	C	5.2.17	RWST to CCP A Suction Valve
11BNG01AD	3504	BNLCV0112D	C	5.2.17	RWST to CCP A Suction Valve
11BNG03AC	3504	BNHV8812A	C	5.2.18	RWST to RHR A Suction Valve
11BNI07CA	3504	BNLT0930	I	5.2.18	RWST Level Transmitter
11EFB01SA	3504	DPEF01A	C	5.2.19	Train A ESW Pump Motor
11EFB01SB	3504	DPEF01A	C	5.2.19	Train A ESW Pump Motor
11EFG02AC	3504	EFHV0023	C	5.2.19	ESW A/Service Water Cross Connect Valve
11EFG02AD	3504	EFHV0023	C	5.2.19	ESW A/Service Water Cross Connect Valve
11EFG02AE	3504	EFHV0023	C	5.2.19	ESW A/Service Water Cross Connect Valve
11EFG02AF	3504	EFHV0023	C	5.2.19	ESW A/Service Water Cross Connect Valve
11EFG02BC	3504	EFHV0024	C	5.2.19	ESW B/Service Water Cross Connect Valve
11EFG02BD	3504	EFHV0024	C	5.2.19	ESW B/Service Water Cross Connect Valve
11EFG02BE	3504	EFHV0024	C	5.2.19	ESW B/Service Water Cross Connect Valve
11EFG02BF	3504	EFHV0024	C	5.2.19	ESW B/Service Water Cross Connect Valve
11EFG03CC	3504	EFHV0041	C	5.2.19	ESW A To Service Water Iso Valve
11EFG03CD	3504	EFHV0041	C	5.2.19	ESW A To Service Water Iso Valve
11EFG03CE	3504	EFHV0041	C	5.2.19	ESW A To Service Water Iso Valve
11EFG03DC	3504	EFHV0042	C	5.2.19	ESW B To Service Water Iso Valve
11EFG03DD	3504	EFHV0042	C	5.2.19	ESW B To Service Water Iso Valve
11EFG03DE	3504	EFHV0042	C	5.2.19	ESW B To Service Water Iso Valve
11EFG04AA	3504	EFHV0059	P	5.2.19	Train A CCW Return to ESW UHS
11EFG04AB	3504	EFHV0059	C	5.2.19	Train A CCW Return to ESW UHS

Table C-24-3
PFSSD Cables Located in Fire Area C-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EFG04AC	3504	EFHV0059	C	5.2.19	Train A CCW Return to ESW UHS
11EFG05AC	3504	EFHV0051	C	5.2.19	ESW A to CCW HX A
11EFG06AC	3504	EFHV0037	C	5.2.19	ESW A to UHS
11EFG07AC	3504	EFHV0031	C	5.2.19	ESW A to CTMT Air Coolers Iso Valve
11EFG08AC	3504	EFHV0049	C	5.2.19	ESW A to CTMT Air Coolers Iso Valve
11EFG09AC	3504	EFHV0033	C	5.2.19	ESW A to CTMT Air Coolers Iso Valve
11EFG09CC	3504	EFHV0045	C	5.2.19	ESW A to CTMT Air Coolers Iso Valve
11EFI08RB	3504	EFPT0001	I	5.2.19	ESW Pump 1A Discharge Pressure
11EFI11EA	3504	EFFT0053	I	5.2.19	ESW A Flow to Power Block
11EGB01AB	3504	DPEG01A	C	5.2.20	CCW Pump A Motor
11EGB01AC	3504	DPEG01A	C	5.2.20	CCW Pump A Motor
11EGB01AD	3504	DPEG01A	C	5.2.20	CCW Pump A Motor
11EGB01AG	3504	DPEG01A	C	5.2.20	CCW Pump A Motor
11EGB01AK	3504	DPEG01A	C	5.2.20	CCW Pump A Motor
11EGB01CB	3504	DPEG01C	C	5.2.20	CCW Pump C Motor
11EGB01CC	3504	DPEG01C	C	5.2.20	CCW Pump C Motor
11EGB01CD	3504	DPEG01C	C	5.2.20	CCW Pump C Motor
11EGB01CG	3504	DPEG01C	C	5.2.20	CCW Pump C Motor
11EGG05AA	3504	EGHV0015	P	5.2.20	CCW A Pump Common Header Return Iso
11EGG05AB	3504	EGHV0015	C	5.2.20	CCW A Pump Common Header Return Iso
11EGG05AC	3504	EGHV0015	C	5.2.20	CCW A Pump Common Header Return Iso
11EGG05CA	3504	EGHV0053	P	5.2.20	A Train CCW Supply To Nuclear Aux Comp.
11EGG05CB	3504	EGHV0053	C	5.2.20	A Train CCW Supply To Nuclear Aux Comp.

Table C-24-3
PFSSD Cables Located in Fire Area C-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EGG05CC	3504	EGHV0053	C	5.2.20	A Train CCW Supply To Nuclear Aux Comp.
11EGG05CD	3504	EGHV0053	C	5.2.20	A Train CCW Supply To Nuclear Aux Comp.
11EGG07AA	3504	EGHV0101	P	5.2.21	CCW A to RHR A Heat Exchanger
11EGG07AB	3504	EGHV0101	C	5.2.21	CCW A to RHR A Heat Exchanger
11EGG07AC	3504	EGHV0101	C	5.2.21	CCW A to RHR A Heat Exchanger
11EGG09AC	3504	EGHV0058	C	5.2.20	CCW To RCS Iso Valve
11EGG09AD	3504	EGHV0058	C	5.2.20	CCW To RCS Iso Valve
11EGG09DA	3504	EGHV0061	P	5.2.20	CCW Return From RCS Iso Valve
11EGG09DB	3504	EGHV0061	C	5.2.20	CCW Return From RCS Iso Valve
11EGG09DC	3504	EGHV0061	C	5.2.20	CCW Return From RCS Iso Valve
11EGG09DD	3504	EGHV0061	C	5.2.20	CCW Return From RCS Iso Valve
11EGG17BA	3504	EGHV0132	C	5.2.20	Thermal Barrier CCW Return HV-62 By-Pass
11EGG17BB	3504	EGHV0132	C	5.2.20	Thermal Barrier CCW Return HV-62 By-Pass
11EGG18AC	3504	EGHV0126	C	5.2.20	CCW To RCS Iso Valve
11EGG18AD	3504	EGHV0126	C	5.2.20	CCW To RCS Iso Valve
11EGI13AA	3504	EGPT0077	I	5.2.20	CCW Pumps A & C Discharge Pressure
11EGI19AB	3504	EGFT0128	I	5.2.20	CCW to RCP Flow Transmitter
11EGK16AA	3504	EGTV0029	C	5.2.20	CCW A Heat Exchanger Bypass Isolation Valve
11EGK16AC	3504	EGTV0029	C	5.2.20	CCW A Heat Exchanger Bypass Isolation Valve
11EJB01AB	3504	DPEJ01A	C	5.2.21	RHR Pump A Motor
11EJG04AA	3504	EJHV8804A	P	5.2.21	RHR A to CVCS CCP Isolation Valve
11EJG04AB	3504	EJHV8804A	C	5.2.21	RHR A to CVCS CCP Isolation Valve
11EJG04AC	3504	EJHV8804A	C	5.2.21	RHR A to CVCS CCP Isolation Valve

Table C-24-3
PFSSD Cables Located in Fire Area C-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EJG05AC	3504	EJHV8701A	C	5.2.21	RCS Hot Leg 1 To RHR Pump A Suction
11EJG05AJ	3504	EJHV8701A	C	5.2.21	RCS Hot Leg 1 To RHR Pump A Suction
11EJG05BC	3504	EJHV8701B	C	5.2.21	RCS Hot Leg 4 To RHR Pump B Suction
11EJG05BJ	3504	EJHV8701B	C	5.2.21	RCS Hot Leg 4 To RHR Pump B Suction
11EJG06AC	3504	EJHV8811A	C	5.2.18	CTMT Recirc Sump To RHR Pump A
11EJG08AC	3504	EJFCV0610	C	5.2.21	RHR A Mini Flow Valve
11EJG09CC	3504	EJHV8809A	C	5.2.21	RHR To Accum Inj Loops 1 & 2 Iso Vlv
11EJG09CD	3504	EJHV8809A	C	5.2.21	RHR To Accum Inj Loops 1 & 2 Iso Vlv
11EMB01AB	3504	DPEM01A	C	5.2.22	SI Pump A Motor
11EMG02AC	3504	EMHV8803A	C	5.2.23	Train A BIT Inlet Valve
11EMG02CF	3504	EMHV8801A	C	5.2.23	Train A BIT Outlet Valve
11EMK12BA	3504	EMHV8964	C	5.2.23	SI Test Line System Outside CTMT Iso Vlv
11ENB01AB	3504	DPEN01A	C	5.2.24	Containment Spray Pump A Motor
11ENG03AC	3504	ENHV0006	C	5.2.24	Containment Spray Pump A Isolation Valve
11ENG03AD	3504	ENHV0006	C	5.2.24	Containment Spray Pump A Isolation Valve
11EPG02AE	3504	EPHV8808A	C	5.2.25	Accumulator Tank A Outlet Iso Valve
11EPG02BE	3504	EPHV8808C	C	5.2.25	Accumulator Tank C Outlet Iso Valve
11GDG01AC	3504	DCGD01A	C	5.2.19	Train A ESW Pump Room Supply Fan
11GDI04AA	3504	GDTE0001	I	5.2.19	ESW Pump Room A Temperature
11GDI04AB	3504	GDTZ0001A	I	5.2.19	Train A ESW Pump Room Inlet Damper
11GDI04AC	3504	GDTZ0001B	I	5.2.19	Train A ESW Pump Room Recirc Damper
11GDY01AA	3504	GDHIS0001A	C	5.2.19	ESW Pump Room A Supply Fan HIS
11GDY01AB	3504	GDHIS0001A	C	5.2.19	ESW Pump Room A Supply Fan HIS

Table C-24-3
PFSSD Cables Located in Fire Area C-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GKG02AA	3504	SGK04A	P	5.2.26	Control Room A/C Unit A
11GKG02AB	3504	SGK04A	C	5.2.26	Control Room A/C Unit A
11GKG02AE	3504	SGK04A	C	5.2.26	Control Room A/C Unit A
11GKG13AB	3504	SGK05A	C	5.2.27	Class 1E Electrical Equip A/C Unit A
11GKG13AE	3504	SGK05A	C	5.2.27	Class 1E Electrical Equip A/C Unit A
11GKG13AF	3504	SGK05A	C	5.2.27	Class 1E Electrical Equip A/C Unit A
11GKG13AG	3504	SGK05A	C	5.2.27	Class 1E Electrical Equip A/C Unit A
11GKG13AJ	3504	SGK05A	C	5.2.27	Class 1E Electrical Equip A/C Unit A
11GKY02AA	3504	GKHZ0029A/B	C	5.2.26	Control Room A/C Unit 4A Return and Supply Dampers
11GKY02AB	3504	GKHZ0029B	C	5.2.26	Control Room A/C Unit 4A Return Damper
11GKY02AC	3504	GKHZ0029A	C	5.2.26	Control Room A/C Unit 4A Supply Damper
11GKY02AD	3504	GKHZ0029A/B	C	5.2.26	Control Room A/C Unit 4A Return and Supply Dampers
11GKY02AE	3504	GKHZ0029A/B	P	5.2.26	Control Room A/C Unit 4A Return and Supply Dampers
11GKY02AF	3504	GKHZ0029A/B	P	5.2.26	Control Room A/C Unit 4A Return and Supply Dampers
11GLG06AD	3504	DSGL11A	C	5.2.20	CCW A Pump Room Cooler Motor
11GNG02AD	3504	DSGN01A	C	5.2.29	Containment Cooler Fan A Motor
11GNG02AH	3504	DSGN01A	C	5.2.29	Containment Cooler Fan A Motor
11GNG02AJ	3504	DSGN01A	C	5.2.29	Containment Cooler Fan A Motor
11GNG02AK	3504	DSGN01A	C	5.2.29	Containment Cooler Fan A Motor
11GNG02CD	3504	DSGN01C	C	5.2.29	Containment Cooler Fan C Motor

Table C-24-3
PFSSD Cables Located in Fire Area C-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GNG02CH	3504	DSGN01C	C	5.2.29	Containment Cooler Fan C Motor
11GNG02CJ	3504	DSGN01C	C	5.2.29	Containment Cooler Fan C Motor
11GNG02CK	3504	DSGN01C	C	5.2.29	Containment Cooler Fan C Motor
11GNI05AA	3504	GNPT0937	I	5.2.2	Containment Pressure Transmitter
11NBB01AB	3504	NBHS0010	C	5.2.30	NB01 Synchro-scope/Selector Switch
11NBB01AD	3504	NBHS0010	C	5.2.30	NB01 Synchro-scope/Selector Switch
11NBB01AE	3504	NBHS0010	C	5.2.30	NB01 Synchro-scope/Selector Switch
11NBB02AC	3504	NB00109	C	5.2.30	Bus NB01 Monitoring and Control
11NBB03BC	3504	NB00112	C	5.2.30	Bus NB01 Monitoring and Control
11NBB12AA	3504	NB00112	C	5.2.30	Bus NB01 Incoming Feeder Breaker DC Control
11NBB12AB	3504	NB00112	C	5.2.30	Bus NB01 Incoming Feeder Breaker DC Control
11NBB12AC	3504	NB00112	C	5.2.30	Bus NB01 Incoming Feeder Breaker DC Control
11NBB12AE	3504	NB00112	C	5.2.30	Bus NB01 Incoming Feeder Breaker DC Control
11NBB12AF	3504	NB00112	C	5.2.30	Bus NB01 Incoming Feeder Breaker DC Control
11NBB12AG	3504	NB00112	C	5.2.30	Bus NB01 Incoming Feeder Breaker DC Control
11NBB13AA	3504	NB00109	C	5.2.30	XNB02 to Bus NB01 Crosstie Feeder Breaker
11NBB13AC	3504	NB00109	C	5.2.30	XNB02 to Bus NB01 Crosstie Feeder Breaker
11NEB10AA	3504	NB00111	C	5.2.28	EDG A to NB01 Feeder Breaker (NEHIS0025)
11NEB10AD	3504	NB00111	C	5.2.28	EDG A to NB01 Feeder Breaker (NEHIS0025)

Table C-24-3
PFSSD Cables Located in Fire Area C-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11NFK01AA	3504	NF039C	P	5.2.36	Load Shed / Sequencer Ch 1 & 4 Term
11NFK01CA	3504	NF039A	C	5.2.36	Load Shed / Sequencer Ch 1 Logic
11NFK01DA	3504	NF039B	C	5.2.36	Load Shed / Sequencer Ch 4 Logic
11NFY01AA	3504	NF039A	P	5.2.36	Load Shed / Sequencer Ch 1 Logic
11NFY01BA	3504	NF039B	P	5.2.36	Load Shed / Sequencer Ch 4 Logic
11NFY01EA	3504	NF039A	C	5.2.36	Load Shed / Sequencer Ch 1 Logic
11NFY01FA	3504	NF039B	C	5.2.36	Load Shed / Sequencer Ch 4 Logic
11NGB10AB	3504	NB00113	C	5.2.31	NG01 Feeder Breaker (NGHIS0001)
11NGB10BB	3504	NB00110	C	5.2.31	NG03 Feeder Breaker (NGHIS0002)
11NGB10SA	3504	NB00116	C	5.2.31	NG05E Feeder Breaker (NGHIS0003)
11NGG01BB	3504	NG003CAF1	P	5.2.31	NG03C Incoming Power Feed from NG0306
11NGG01BC	3504	NG003CAF1	P	5.2.31	NG03C Incoming Power Feed from NG0306
11NGG11AA	3504	NG00101	C	5.2.31	Bus NG01 Feeder Breaker Control (NGHIS0009)
11NGG11BA	3504	NG00301	C	5.2.31	Bus NG03 Feeder Breaker Control (NGHIS0011)
11PKK10AA	3504	PK21	C	5.2.31	Train A 125 VDC Non-Class 1E Battery Chgr
11PKK10AB	3504	PK21	C	5.2.31	NG0102 Breaker Control Power
11QDK01AA	3504	QD01, QD02, QD03, QD04, QD05, QD06	P	5.2.40	Control Room Emergency Lights
11RLK01AA	3504	NK04119	P	5.2.32	125 VDC to RC & Support Sys Control Panel (RL001/RL002)
11RLK01CA	3504	NK04112	P	5.2.32	125 VDC to ESF Control Panel (RL017/RL018)
11RLK01DA	3504	NK04113	P	5.2.32	125 VDC to ESF Control Panel (RL019/RL020)

Table C-24-3
PFSSD Cables Located in Fire Area C-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11RLK01EA	3504	NK05109	P	5.2.32	125 VDC to Reactor Auxiliary Control Panel (RL021/RL022)
11RPY09CA	3504	RP053AC	P	5.2.33	120 VAC to BOP Instrumentation Rack from NN0116
11RPY09DA	3504	RP053AC	P	5.2.33	120 VAC to BOP Instrumentation Rack from NN0120
11RPY10BA	3504	RP068	P	5.2.19	120 VAC to BOP Control Panel from NG01ACR1
11SAK21AA	3504	SA036A	P	5.2.7	125 VDC to ESFAS Channel 1 Termination Cab from NK5110
11SAY21AA	3504	SA036A	P	5.2.7	120 VAC to ESFAS Channel 1 Termination Cab from NN0103
11SAZ19EA	3504	GKHZ0029A/B	C	5.2.26	SGK04A Supply/Return Dampers Status Panel Input
11SAZ19JA	3504	SGK04A	C	5.2.26	Status Panel SA066A Input from SGK04A
11SAZ19KA	3504	SGK05A	C	5.2.27	Status Panel SA066A Input from SGK05A
11SBS01AD	3504	SB029A	P	5.2.34	120 VAC to SSPS A Input Panel from NN0110
11SBS02AD	3504	SB032A	P	5.2.34	120 VAC to SSPS B Input Panel from NN0109
11SBS05AE	3504	SB029D	P	5.2.34	120 VAC to SSPS A Output Panel from NN0112
11SBS05AF	3504	SB029D	P	5.2.34	125 VDC to SSPS A Output Panel from NK4118
11SBS12AC	3504	SB102A	C	5.2.34	Reactor Trip Switchgear A
11SBY09CA	3504	SB038	P	5.2.34	120 VAC to Process Protection Set 1 Panel from NN0111
11SES01AA	3504	SE054A	P	5.2.35	120 VAC to Nuclear Instrumentation Sys Rack 1 Panel from NN0113

Table C-24-3
PFSSD Cables Located in Fire Area C-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11SES07BB	3504	SENY0060B	I	5.2.35	Source Range Monitor
15BBA01AC	3504	DPBB01A	C	5.2.41	Reactor Coolant Pump A Motor
15BBA01BC	3504	DPBB01B	C	5.2.41	Reactor Coolant Pump B Motor
15BBI19AA	3504	BBPCV0455B	I	5.2.42	Pressurizer Spray Valve
15BBI19BA	3504	BBPCV0455C	I	5.2.42	Pressurizer Spray Valve
15BGK10AA	3504	BGLCV0459	C	5.2.37	Letdown Isolation Valve
15BGK10AD	3504	BGLCV0459	C	5.2.37	Letdown Isolation Valve
15BGK10BA	3504	BGLCV0460	C	5.2.37	Letdown Isolation Valve
15BGK10BD	3504	BGLCV0460	C	5.2.37	Letdown Isolation Valve
15BGK35AB	3504	BGHV8149A	C	5.2.37	Letdown Orifice Isolation Valve
15BGK35AD	3504	BGHV8149A	C	5.2.37	Letdown Orifice Isolation Valve
15BGK35BB	3504	BGHV8149B	C	5.2.37	Letdown Orifice Isolation Valve
15BGK35BD	3504	BGHV8149B	C	5.2.37	Letdown Orifice Isolation Valve
15BGK35CB	3504	BGHV8149C	C	5.2.37	Letdown Orifice Isolation Valve
15BGK35CD	3504	BGHV8149C	C	5.2.37	Letdown Orifice Isolation Valve
15BMK16AA	3504	BM157	P	5.2.38	125 VDC to Blowdown Control Panel from PK5123
15EJI12AA	3504	EJHCV0606	I	5.2.21	RHR A Heat Xchgr Discharge Control Valve (EJHY0606)
15EMK05EA	3504	EMHV8882	C	5.2.23	Boron Injection Downstream Test Line Iso Vlv
15FCY35AA	3504	FC169A	P	5.2.45	Steam Generator Feed Pump A Term Cabinet
15GKK31CA	3504	95XGK07	C	5.2.27	SGK05A Fire Signal Isolation
15GKK31CB	3504	95XGK07	C	5.2.27	SGK05A Fire Signal Isolation

Table C-24-3
PFSSD Cables Located in Fire Area C-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15NBA10AA	3504	NB00112	C	5.2.30	Bus NB01 Incoming Feeder Breaker Control
15NBA10AD	3504	NB00112	C	5.2.30	Bus NB01 Incoming Feeder Breaker Control
15NBB03AJ	3504	XNB01	P	5.2.30	XNB01 Differential Relay (MA104F)
15PGA10AA	3504	PA0105	C	5.2.44	Load Centers PG11, PG13 and PG25 Fdr Bkr
15PGA10BA	3504	PA0106	C	5.2.44	Load Centers PG15, PG17 and PG19 Fdr Bkr
15PGA10BB	3504	PA0106	C	5.2.44	Load Centers PG15, PG17 and PG19 Fdr Bkr
15PGG13DA	3504	PG1901	C	5.2.44	Bus PG19 Feeder Breaker
15PGG13DC	3504	PG1901	C	5.2.44	Bus PG19 Feeder Breaker
15PNY01AR	3504	PG019GFR3	P	5.2.39	XPN07D Instrumentation Bus XFMR-Alt Supply
15PNY02AA	3504	PN310	P	5.2.45	120 VAC Power from PN03 (Hot Side)
15PNY02AB	3504	PN310	P	5.2.45	120 VAC Power from PN03 (Neutral)
15RLK01AA	3504	PK05117	P	5.2.37	125 VDC to RC & Support Sys Control Panel (RL001/RL002)
15RLK01CA	3504	PK06115	P	5.2.30	125 VDC to Site Related Control Panel (RL013/RL014)
15RLK01DA	3504	PK06116	P	5.2.23	125 VDC to ESF Control Panel (RL017/RL018)
15RLY01DA	3504	PN00736	P	5.2.21	120 VAC to ESF Control Panel (RL017/RL018)
15RLY01EA	3504	PN00738	P	5.2.10	120 VAC to Reactor Auxiliary Control Panel (RL021/RL022)
15RLY01HA	3504	PG019GCR2	P	5.2.4	120 VAC to Turbine Generator and Feedwater Control Panel (RL023/RL024)
15RPK09EA	3504	PK05129	P	5.2.38	125 VDC to Auxiliary Relay Rack RP211
15RPK09NA	3504	PK05126	P	5.2.27	125 VDC to Reverse Isolation Relay Rack RP330

Table C-24-3
PFSSD Cables Located in Fire Area C-24

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15RPK09RA	3504	PK05113	P	5.2.30	125 VDC Power to Master Supervisory Station RP060

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

5.2.1 Steam Generator Atmospheric Relief Valves

PFSSD requires at least two steam generator atmospheric relief valves (ARV) be controlled and the other two closed. The ARVs are pneumatically operated using air from the compressed air system (KA) or nitrogen from the nitrogen accumulators. The valves open by pneumatic pressure and close by spring action. The valves are automatically controlled by a pressure transmitter input signal from a pressure transmitter installed on the outlet side of the steam generator. Alternatively, each valve can be controlled manually from the control room or the auxiliary shutdown panel by placing the pressure indicating controller (PIC) in manual.

As discussed in Section 5.2.7, a fire in area C-24 could damage cables and equipment associated with the Train A Motor Driven Auxiliary Feedwater Pump (MDAFP). The Turbine Driven Auxiliary Feedwater Pump (TDAFP) and the Train B MDAFP are available. The TDAFP can be lined up to feed steam generators B and C while the Train B MDAFP can be used to supply auxiliary feedwater to Steam Generators A and D.

Cables associated with steam generator A ARV ABPV0001 are run in this area. Damage to these cables could prevent control or isolation of the ARV. A single open ARV is bounded by the main steamline break analysis. If necessary, ABPV0001 can be failed closed by isolating air and nitrogen to the valve using KAV1435 (air) and KAV1364 (nitrogen) then venting air from the regulator. These valves are located in area A-23 and emergency lighting is available.

Steam generator ARVs ABPV0002, ABPV0003 and ABPV0004 are unaffected by a fire in this area and remain available to control steam release through steam generators B, C and D.

If ARV ABPV0001 control is lost, cooldown can be performed using the TDAFP, taking suction from the Train B ESW system and supplying steam generators B and C. Alternatively, the Train B MDAFP can be used to supply AFW to steam generator D and the TDAFP can be used to supply AFW to either steam generators B or C.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB20A, E-13AB20B, E-1F9101, J-110-00216, J-110-00217, M-12AB01, M-12KA04, M-12KA05

5.2.2 Safety Injection and Containment Spray

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. A spurious containment spray actuation signal (CSAS) could cause the containment spray pumps to operate, depleting inventory in the RWST. These conditions are not desirable for PFSSD at Wolf Creek.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Containment spray (CS) is initiated automatically by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937.

Cables associated with ABPT0514, ABPT0524, ABPT0534, ABPT0544, BBPT0455 and GNPT0937 are run in area C-24. Cables associated with the remaining transmitters do not run in area C-24. Consequently, a spurious CSAS and SIS cannot occur if a fire occurs in area C-24.

References: E-15000, XX-E-013, E-13AB21, E-13BB16, E-13GN05, E-1F9431, E-1F9432, E-1F9433, M-12AB01, M-12BB02, M-12GN01

5.2.3 Main Steam Isolation Bypass Valves

Each of the four MSIV bypass valves (ABHV0012, ABHV0015, ABHV0018 and ABHV0021) has two redundant solenoids that control the position of the associated bypass valve. The bypass valves are normally closed with the solenoids de-energized. Both solenoids need to be energized to open the valve. One of the solenoids on each valve is on separation group 1 (Train A) and is controlled by handswitch ABHS0080. The other solenoid on each valve is on separation group 4 (Train B) and is controlled by handswitch ABHS0079.

Cable 11ABK23AE is associated with steam line isolation signal relay K627. Upon receipt of a steam line isolation signal, the relay contact opens and the bypass valves close. An open circuit in one of the two conductors will produce the same result as a steam line isolation signal, which is desired for PFSSD. A hot short between the conductors will bypass the contact and prevent a steam line isolation signal from closing the valves.

Cable 11ABK23AF is associated with handswitch ABHS0080 on the Train A MSIV bypass valve control circuit. An open circuit in one of the two conductors will de-energize the respective solenoid and close the bypass valves. A hot short between the conductors will bypass the handswitch contact and prevent closure of the valves using the handswitch.

Cable 11ABK23AG is associated with MSIV bypass valves ABHV0012, ABHV0015, ABHV0018 and ABHV0021. The bypass valves are normally closed, which is the desired PFSSD position. In order for the valves to spuriously open, both solenoids on the air line need to be energized. An external cable hot short on cable 11ABK23AG could energize the Train A solenoids but the Train B solenoids are unaffected by a fire in area C-24. In addition, hand switch ABHS0079 is available to ensure the bypass valves are closed. Therefore, a fire in area C-24 will not affect the ability to isolate the MSIV bypass valves.

Redundant means are available to ensure the MSIV bypass valves are closed. Handswitch ABHS0079 is unaffected by the fire and can be used to ensure one of the two solenoids on each bypass valve is de-energized.

References: E-15000, XX-E-013, E-13AB23A, E-13AB23B, E-1F9101, M-12AB02

5.2.4 Steam Generator Main Steam Isolation Valves (MSIVs)

PFSSD requires the MSIVs be closed to prevent reactivity addition due to uncontrolled cooldown. The MSIVs are closed from the control room using all close hand switches ABHS0079 or ABHS0080.

Each MSIV is designed to utilize system fluid (main steam) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve

and isolate main steam. This is done by actuating either all close hand switch ABHS0079 (separation group 4) or ABHS0080 (separation group 1) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MSIV	ABHS0079 (Sep Group 4)		ABHS0080 (Sep Group 1)	
	Solenoids	Cable	Solenoids	Cable
ABHV0011	MV2, MV4, MV6	14ABK28BH	MV1, MV3, MV5	11ABK29BH
ABHV0014	MV2, MV4, MV6	14ABK29AH	MV1, MV3, MV5	11ABK28AH
ABHV0017	MV2, MV4, MV6	14ABK28AH	MV1, MV3, MV5	11ABK29AH
ABHV0020	MV2, MV4, MV6	14ABK29BH	MV1, MV3, MV5	11ABK28BH

All 4 cables associated with the 12 separation group 1 solenoid valves are run in area C-24. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 4 cables associated with hand switch ABHS0079 are unaffected by a fire in area C-24. Therefore, hand switch ABHS0079 is available to close the four MSIVs.

Cable 11ABK30BB provides 125 VDC power to Train A main steam and feedwater isolation system (MSFIS) actuation cabinet SA075A from NK5119. Damage to this cable would disrupt power to the separation group 1 solenoids and close the MSIVs, which is the desired PFSSD position. In addition, the Train B MSFIS is unaffected by the fire and ABHS0079 is available to close the MSIVs.

Cable 15RLY01HA supplies 120 VAC power to MCB RL023/RL024 miscellaneous circuits from PG19GCR217. Several loads are supplied by this power supply, but only eight are PFSSD components. These are ABLV0051, ABLV0053, ABFV0023, ABFV0025, ABFV0027, ABFV0029, FCHV0003, and ABHIS0032 which are components downstream of the Main Steam Isolation Valves (MSIVs). Loss of power to ABLV0051, ABLV0053, ABFV0023, ABFV0025, ABFV0027, ABFV0029 and FCHV0003 could fail the valves open. Loss of power to ABHIS0032 will cause a loss of handswitch indicator lights. However, a fire in area C-24 does not affect the ability to close the MSIVs and MSIV bypass valves using handswitch ABHS0079 in the main control room. Therefore, the MSIV downstream components can fail in an undesired position without any consequence on PFSSD.

Based on the above discussion, hand switch ABHS0079 is available to close the MSIVs in the event of a fire in area C-24.

References: E-15000, XX-E-013, E-13AB23A, E-13AB23B, E-13AB26, E-13AB27, E-13AB28, E-13AB29, E-13AB30, E-13RL01, E-13RL07, E-1F9101, E-1F9103, J-104-00295, J-104-00296, M-12AB02

5.2.5 Steam Generator Level Indication

The decay heat removal function for PFSSD requires the use of two RCS loops and two Steam Generators. Steam generator (SG) level indication is required to support this function. A fire in area C-24 credits MDAFP B supplying SG D and the TDAFP supplying either SG B or C. As discussed in Section 5.2.1, steam generator A ARV ABPV0001 control could be lost.

Cables associated with SG level transmitters AELT0501 (SG A WR), AELT0551 (SG A NR), AELT0529 (SG B NR), AELT0539 (SG C NR) and AELT0554 (SG D NR) are run in area C-24. Damage to these cables due to a fire will prevent indication on the associated level indicators in the control room. Alternate level indication remains available on all four SGs using the following level indicators:

Steam Generator	Available Level Indication
A	AELI0517 (NR), AELI0518 (NR), AELI0519 (NR)
B	AELI0502 (WR), AELI0527 (NR), AELI0528 (NR), AELI0552 (NR)
C	AELI0503 (WR), AELI0537 (NR), AELI0538 (NR), AELI0553 (NR)
D	AELI0504 (WR), AELI0547 (NR), AELI0548 (NR), AELI0549 (NR)

Based on the above discussion, level indication on all four steam generators is assured if a fire occurs in area C-24.

References: E-15000, XX-E-013, E-1F9203, E-13AE08, E-13AE12, M-12AE02

5.2.6 Steam Generator Main Feedwater Isolation Valves

PFSSD requires that either the main feedwater isolation valves (MFIVs) be closed, or the main feedwater pumps be stopped to prevent overfilling the steam generators. Flow diversion from auxiliary feedwater (AFW) to the main feedwater system piping is prevented by check valves AEV0420, AEV0421, AEV0422 and AEV0423. Closure of the main feedwater isolation valves is not required to prevent AFW flow diversion.

Each MFIV is designed to utilize system fluid (feedwater) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main feedwater. This is done by actuating either all close hand switch AEHS0080 (separation group 1) or AEHS0081 (separation group 4) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MFIV	AEHS0080 (Sep Group 1)		AEHS0081 (Sep Group 4)	
	Solenoids	Cable	Solenoids	Cable
AEFV0039	MV1, MV3, MV5	11AEK16AH	MV2, MV4, MV6	14AEK17AH
AEFV0040	MV1, MV3, MV5	11AEK17AH	MV2, MV4, MV6	14AEK16AH
AEFV0041	MV1, MV3, MV5	11AEK16BH	MV2, MV4, MV6	14AEK17BH
AEFV0042	MV1, MV3, MV5	11AEK17BH	MV2, MV4, MV6	14AEK16BH

All 4 cables associated with the 12 separation group 1 solenoid valves are run in area C-24. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 4 cables associated with hand switch AEHS0081 are unaffected by a fire in area C-24. Therefore, hand switch AEHS0081 is available to close the four MFIVs.

Cable 11ABK30BB provides 125 VDC power to Train A main steam and feedwater isolation system (MSFIS) actuation cabinet SA075A from NK5119. Damage to this cable would disrupt power to the separation group 1 solenoids and close the MFIVs, which is the desired PFSSD position. In addition, the Train B MSFIS is unaffected by the fire and AEHS0081 is available to close the MFIVs.

Based on the above discussion, MFIV isolation is assured using hand switch AEHS0081.

References: E-15000, XX-E-013, E-13AB30, E-13AE14, E-13AE15, E-13AE16, E-13AE17, E-1F9201, J-104-00295, J-104-00296, M-12AE02, M-630-00044

5.2.7 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire auxiliary feedwater (AFW) demand to achieve cold shutdown.

Motor operated valves (MOVs) in the system allow operators to line up the AFW system as required to achieve and maintain safe shutdown. Damage to the MOV circuits due to a fire could prevent operators from lining up the system from the control room.

Several PFSSD cables associated with various components of the AFW system (AL) run through fire area C-24. These cables are identified in Table C-24-3. All cables are associated with Train A (separation group 1). There are no Train B (separation group 4) cables associated with the AFW system running through area C-24.

Damage to the Train A cables listed in Table C-24-3 could prevent operation of Train A MDAFP. However, Train B MDAFP and the TDAFP are unaffected by a fire in area C-24. The suction source to the Train B MDAFP is available from the CST and Train B ESW. The suction source to the TDAFP is available from Train B ESW only. The TDAFP is available to supply AFW to steam generators B and C but the capability of the TDAFP to supply steam generators A and D could be affected.

Condensate storage tank pressure transmitters ALPT0037, ALPT0038 and ALPT0039 are included in the PFSSD design because they initiate swapover to ESW upon 2/3 low CST pressure indications. Panels SA036A, SA036B and SA036C monitor pressure transmitter signals on ALPT0037, ALPT0039 and ALPT0038, respectively. A spurious low CST pressure due to fire damage to cables associated with two of these pressure transmitters could swap the water source to ESW. This is only a commercial concern and should be prevented if possible.

Cable 11ALI08AA is an instrument cable associated with ALPT0037. Cables associated with the remaining two pressure transmitters are not run in C-24. Therefore, swapover to ESW due to spurious low CST pressure is not feasible if a fire occurs in this area.

Cable 11SAK21AA supplies 125 VDC power to panel SA036A from NK5110. Cable 11SAY21AA supplies 120 VAC power to panel SA036A from NN0103. Damage to these cables could result in a loss of power to the panel and could prevent automatic operation of Train A low suction pressure (LSP) swapover. Power cables associated with LSP signals controlled by panels SA036B and SA036C are unaffected by a fire in this area.

As discussed in Section 5.2.1, steam generator A ARV control could be lost. Therefore, it may be necessary to isolate steam generator A ARV and cooldown using steam generators B, C and/or D.

Based on the above discussion, auxiliary feedwater is assured if a fire occurs in area C-24 using Train B MDAFP supplying auxiliary feedwater to steam generator D and the TDAFP supplying AFW to steam generators B and C.

References: E-15000, XX-E-013, E-13AL01A, E-13AL01B, E-13AL02A, E-13AL02B, E-13AL03A, E-13AL03B, E-13AL04A, E-13AL04B, E-13AL05A, E-13AL05B, 13AL07A, E-13AL08, E-13AL09, E-13SA21, E-1F9202, E-1F9203, E-1F9204, E-1F9402A, E-1F9402B, J-10SA, M-12AL01

5.2.8 Pressurizer PORVs and Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed. Cables and components associated with PORV BBPCV0455A and associated block valve BBHV8000A are run through area C-24. Cables and components associated with PORV BBPCV0456A and associated block valve BBHV8000B are not located in area C-24.

The pressurizer PORVs are not considered high/low pressure interfaces. The valves are supplied power by an ungrounded 125 VDC system. Therefore, based on GL 86-10, consideration of multiple proper polarity hot shorts is not required. A single proper polarity hot short still needs to be considered.

In the event a fire causes BBPCV0455A to open and damages BBHV8000A cables, Operators can close BBPCV0455A by placing hand switch BBHIS0455A, located on RL021, in the close position. Pressurizer level and RCS pressure indication are available to diagnose a failed open PORV using BBLI0460A and BBPI0406, respectively. In addition, pressurizer pressure indication is available using BBPI0456, BBPI0457 and BBPI0458.

Instrument cable 11BBI16KB associated with pressurizer pressure transmitter BBPT0455 is run in fire area C-24. Damage to this cable could send a spurious high-pressure signal to the pressurizer master controller. However, as discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure channel will not cause the spurious operation of the pressurizer PORVs.

Based on the above discussion, pressurizer PORV BBPCV0455A could spuriously open due to damage to the PORV control cables. The PORV can be closed using hand switch BBHIS0455A in the main control room.

References: E-15000, XX-E-013, E-13BB16, E-13BB39, E-13BB40, E-1F9201, E-1F9301, M-12BB02, CR 13079, DCP 12944, DCP 13324

5.2.9 Reactor Coolant System (RCS) Pressure Indication

The PFSSD design requires RCS pressure indication to be available. RCS pressure indication is provided in the control room using BBPT0405/BBPI0405 or BBPT0406/BBPI0406. Cable 11BBI15EB, associated with BBPT0405, runs through fire area C-24 and could be damaged by a fire.

Redundant RCS pressure transmitter BBPT0406 is unaffected by a fire in area C-24. Therefore, RCS pressure indication is available using BBPT0406/BBPI0406.

References: E-15000, XX-E-013, E-13BB15, E-13BB16, E-1F9201, E-1F9205, M-12BB04

5.2.10 RCS Hot and Cold Leg Temperature Elements

PFSSD requires RCS hot and cold leg temperature indication on at least one loop to verify flow through the steam generators. The temperature elements used for this purpose are listed in the following table.

As identified in Table C-24-3, cables associated with RCS temperature elements BBTE0413A, BBTE0423A, BBTE0433B and BBTE0443B are run in area C-24. A fire could damage these cables and prevent temperature indication on the four temperature elements. Consequently, temperature indication on at least one leg on each loop could be lost, which is not in accordance with the PFSSD methodology at Wolf Creek.

RCS Hot and Cold Leg Temperature Elements Used for PFSSD	
COMPONENT	**FUNCTION**
BBTE0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	RCS Cold Leg Temperature Element (WR) Loop 4

Cable 15RLY01EA supplies 120 VAC power from PN0738 to RL021/RL022. The power splits at RL021/RL022 and supplies power to PFSSD component BBTR0423 as well as some non-PFSSD components. This temperature recorder provides indication of RCS hot and cold leg temperature on loop 2.

Procedure EMG ES-04, Attachment B Section B1 provides alternate indication in the control room that may be used to verify natural circulation flow. One of these methods verifies that steam generator pressure is stable or decreasing. Based on Sections 5.2.1 and 5.2.7, cooldown can be performed using loops 2, 3 and 4. Based on Section 5.2.2, S/G B pressure instruments ABPT0525 and ABPT0526; S/G C pressure instruments ABPT0535 and ABPT0536; and S/G D pressure instruments ABPT0545 and ABPT0546 are unaffected by a fire in C-24. These pressure instruments, along with their respective indicators in the control room, can be used, per EMG ES-04, to verify heat removal in loops 2, 3 and 4.

The configuration is acceptable because, in the event of a fire in area C-24, cooldown can be performed using RCS loops 2, 3 and 4. The associated indicating devices for RCS wide range hot and cold leg temperature elements (BBTE0423B, BBTE0433A and BBTE0443A) as well as ABPT0525, ABPT0526, ABPT0535, ABPT0536, ABPT0545 and ABPT0546 will provide indication of flow through the steam generators.

References: E-15000, XX-E-013, E-13BB15, E-13RL01, E-13RL06, E-1F9201, M-12AB01, M-12BB01, EMG ES-04

5.2.11 Pressurizer Level Transmitters

PFSSD requires pressurizer level indication to be available. Level transmitters BBLT0459 and BBLT0460 provide pressurizer level indication. A cable associated with BBLT0459 runs through area C-24 and could be damaged, causing inoperability of BBLT0459 and its associated level indicator (BBLI0459A). Cables for BBLT0460/BBLI0460A do not run through fire area C-24.

Pressurizer level indication is available using BBLT0460/BBLI0460A if a fire occurs in area C-24.

References: E-15000, XX-E-013, E-13BB16, E-1F9301, M-12BB02

5.2.12 Reactor Head Vent Valves

PFSSD requires that one of the two reactor vessel head vent valves on each flow path (2 flow paths total) be closed to prevent uncontrolled depressurization of the RCS. Either BBHV8001A or BBHV8002A and either BBHV8001B or BBHV8002B needs to be closed.

A cable associated with head vent valve BBHV8001A runs through C-24. Cables for the remaining valves are unaffected. Therefore, the reactor head vent flow path will remain isolated throughout the event.

References: E-15000, XX-E-013, E-1F9301, E-13BB30, M-12BB04

5.2.13 Centrifugal Charging System

At least one centrifugal charging pump (CCP) is required for PFSSD to provide RCP seal cooling, reactivity control and inventory control. These functions are accomplished using a CCP taking suction from the refuelling water storage tank (RWST) and injecting through the RCP seals. RCP seal injection provides approximately 20 gpm makeup to the RCS and provides adequate boron concentration to maintain sub-critical reactivity conditions. If RCP seal injection is unavailable, reactivity and inventory control is provided by lining up the CCPs to the boron injection tank (BIT). The normal charging pump (NCP) is not credited and is assumed lost.

A control cable associated with Train A Centrifugal Charging Pump (CCP) runs through area C-24. Damage to this cable could prevent operation of the pump. Redundant Train B CCP cables are run in a separate fire area and are unaffected by a fire in this area.

Control cables associated with Train A CCP miniflow valve BGHV8110 are run through area C-24. Redundant Train B cables for miniflow valve BGHV8111 are run in a different area and are unaffected by a fire in area C-24.

Cable 11BGG52AC associated with Train A RCP seal injection flow throttling valve BGHV8357A is run in area C-24. Damage to this cable will prevent operation of the valve from the control room. PFSSD requires RCP seal injection using an available centrifugal charging pump and flowing through the associated throttling valve. Cables associated with redundant Train B valve BGHV8357B are run in a separate fire area and are unaffected by a fire in area C-24.

Cable 11BGI51AA is associated with RCP seal total flow transmitter BGFT0215A. Damage to this cable could prevent operation of the flow transmitter and could prevent operators from determining total RCP seal flow using flow indicator BGFI0215A. Flow indicator BGFI0215B is unaffected by a fire in area C-24 and can be used by operators to determine if seal flow is functioning.

Based on the above discussion, PFSSD is assured using Train B charging pump and aligning RCP seal injection flow through BGHV8357B. Operators can use flow indicator BGFI0215B to diagnose a loss of RCP seal injection in the event of a loss of the operating charging pump.

References: XX-E-013, E-15000, E-13BG01, E-13BG11B, E-13BG51, E-13BG52, E-1F9102, E-1F9302, E-1F9401A, M-12BG03

5.2.14 Charging Flow to Regenerative Heat Exchanger Isolation Valves

PFSSD requires charging flow to be directed to the RCP seals. To ensure adequate flow to RCP seals, flow diversion to the regenerative heat exchanger needs to be prevented. Valves BGHV8105 and BGHV8106 are included in the PFSSD design to perform this function. Manual valve BG8402B is also included to provide an alternate means of closing this flow path if either BGHV8105 or BGHV8106 are unavailable and is also used during alternate safe shutdown per OFN RP-017.

Cables associated with BGHV8106 are run in area C-24 and could be damaged by a fire, preventing valve BGHV8106 from being closed from the control room. Cables associated with redundant valve BGHV8105 do not run in area C-24. Consequently, valve BGHV8105 can be isolated from the control room if a fire occurs in area C-24.

References: E-15000, XX-E-013, E-13BG11A, E-1F9102, E-1F9302, M-12BG03

5.2.15 Volume Control Tank (VCT)

Power and control cables associated with VCT valve BGLCV0112B run through fire area C-24. Cables for redundant VCT valve BGLCV0112C are run in a separate fire area and are unaffected by a fire in area C-24. The PFSSD position of these valves is at least one closed. Therefore, PFSSD can be accomplished by isolation of BGLCV0112C.

A hot short could cause inadvertent closure of BGLCV0112B. If this occurs prior to establishing suction from the RWST, damage to the operating charging pump could occur due to loss of suction. The assumptions in calculation XX-E-013 state that systems and components are in their normal operating position or status prior to the fire. The Normal Charging Pump (NCP) is the normally operated pump and is assumed to be operating at the time of the fire. Inadvertent closure of valve BGLCV0112B with no suction from the RWST would result in damage to the NCP but the centrifugal charging pumps would remain unaffected. As stated in 5.2.13, the A Train CCP could be unavailable but the B Train CCP is unaffected by the fire.

A cable (11BGI51CA) associated with VCT level transmitter BGLT0112 runs through area C-24. A false low-low level signal associated with this level transmitter could initiate refueling water sequence, which is the desired PFSSD lineup. Damage to this cable could also cause a spurious VCT level indication on BGLI0112 in the control room. Cables associated with VCT level transmitter BGLT0185 are unaffected by the fire and BGLI0185 will provide reliable level indication in the control room.

Based on the above discussion, a fire in area C-24 that affects components associated with the VCT will not adversely impact the ability to achieve and maintain PFSSD.

References: XX-E-013, E-15000, E-13BG12, E-13BG12A, E-13BG51, E-13BN01, E-1F9102, E-1F9302, M-12BG03

5.2.16 Excess Letdown Isolation Valves

PFSSD requires the excess letdown path be isolated to prevent uncontrolled depressurization of the RCS. To accomplish this, either normally closed valve BGHV8153A or BGHV8154A must be maintained closed and either normally closed valve BGHV8153B or BGHV8154B must be maintained closed.

A cable associated with valve BGHV8154A is run in area C-24. Cables associated with remaining excess letdown valves are not run in area C-24. Therefore, excess letdown will remain isolated throughout the event.

References: E-15000, XX-E-013, E-13BG48, E-1F9301, M-12BG01

5.2.17 Refueling Water Storage Tank (RWST) to Charging Pumps Suction Isolation Valves

Cables associated with RWST to CCP A valve BNLCV0112D run through fire area C-24. As stated earlier, the Train A CCP may not be available if a fire occurs in area C-24. Therefore, the Train B CCP is used, taking suction from the RWST. Cables associated with valve BNLCV0112E are unaffected by a fire in area C-24. Therefore, BNLCV0112E can be opened from the control room to provide the necessary suction from the RWST to Train B CCP.

References: E-15000, XX-E-013, E-13BN01, E-1F9102, E-1F9302, M-12BN01

5.2.18 Refueling Water Storage Tank (RWST) and Containment Sump Isolation Valves

To prevent draindown of the RWST into the containment sump, PFSSD requires that either valve BNHV8812A or valve EJHV8811A and valve BNHV8812B or valve EJHV8811B be closed during hot standby. For cold shutdown, the operating train containment sump valve (EJHV8811A or EJHV8811B) must be maintained closed to prevent flow diversion from the RCS to the containment sump. Valves BNHV8812A and BNHV8812B are normally open and valves EJHV8811A and EJHV8811B are normally closed.

A control cable for valve BNHV8812A runs through fire area C-24. Damage to this cable could prevent closing this valve from the control room and could prevent the valve from automatically closing when valve EJHV8811A reaches full open position.

A control cable (11EJG06AC) associated with valve EJHV8811A runs through fire area C-24. Damage to this cable will not result in valve EJHV8811A opening as long as valve BNHV8812A remains open. If valve BNHV8812A is fully closed, it will provide a permissive for valve EJHV8811A to open. If valve EJHV8811A opens due to damage to cable 11EJG06AC, draindown will not occur since valve BNHV8812A is closed.

The instrument cable for RWST level transmitter BNLT0930 runs through area C-24. Cables for the remaining three RWST level transmitters are available. Therefore, RWST level indication is available using BNLI0931, BNLI0932 and BNLI0933.

Based on the above discussion, draindown of the RWST to the containment sump is not credible if a fire occurs in area C-24.

References: E-15000, XX-E-013, E-13BN03, E-13BN03A, E-13BN07, E-13EJ06A, E-13EJ06B, E-1F9102, E-1F9205, M-12BN01, M-12EJ01, M-10BN

5.2.19 Essential Service Water System

One train of Essential Service Water (ESW) is required to be operable to ensure adequate cooling for essential equipment. A number of cables associated with Train A ESW components are run in this area. Therefore, Train A ESW cannot be relied on for PFSSD if a fire occurs in this area. Cables associated with Train B ESW are run in a different fire area. Therefore, Train B ESW is available if a fire occurs in area C-24.

Valve EFHV0023 is a normally open isolation valve on the service water system feed to the Train A Essential Service Water System. Either this valve or valve EFHV0025 is required to be closed when operating the Train A ESW system for PFSSD. Power and control cables associated with EFHV0023 are run in this area. Damage to these cables could prevent closing EFHV0023 from the control room. Redundant valve EFHV0025 is unaffected by a fire in area C-24 and can be closed from the control room to isolate this flowpath. In addition, check valve EFV0470 is installed in this line and will prevent flow diversion in the unlikely event valve EFHV0025 cannot be closed.

Valve EFHV0024 is a normally open isolation valve on the service water system feed to the Train B Essential Service Water System. Either this valve or valve EFHV0026 is required to be closed when operating the Train B ESW system for PFSSD. Power and control cables associated with EFHV0024 are run in this area. Damage to these cables could prevent closing EFHV0024 from the control room. Redundant valve EFHV0026 is unaffected by a fire in area C-24 and can be closed from the control room to isolate this flowpath. In addition, check valve EFV0471 is installed in this line and will prevent flow diversion in the unlikely event valve EFHV0026 cannot be closed.

Valve EFHV0041 is a normally open isolation valve on the return line from the Train A Essential Service Water System to the service water system. Either this valve or valve EFHV0039 is required to be closed when operating the Train A ESW system for PFSSD. Power and control cables associated with EFHV0041 are run in this area. Damage to these cables could prevent closing EFHV0041 from the control room. Redundant valve EFHV0039 is unaffected by a fire in area C-24 and can be closed from the control room to isolate this flowpath.

Valve EFHV0042 is a normally open isolation valve on the return line from the Train B Essential Service Water System to the service water system. Either this valve or valve EFHV0040 is required to be closed when operating the Train B ESW system for PFSSD. Power and control cables associated with EFHV0042 are run in this area. Damage to these cables could prevent closing EFHV0042 from the control room. Redundant valve EFHV0040 is unaffected by a fire in area C-24 and can be closed from the control room to isolate this flowpath.

Valve EFHV0037 is the Train A return isolation valve from ESW to the Ultimate Heat Sink. This valve is required to be open when operating the Train A ESW system for PFSSD. A cable (11EFG06AC) associated with this valve is run in this area and damage could cause the valve to spuriously close. Circuits for redundant Train B valve EFHV0038 are not run in area C-24 and will be unaffected by the fire.

Cable 11GDI04AA provides ESW A room temperature from temperature element GDTE0001 to temperature controller GDTC0001. Cables 11GDI04AB and 11GDI04AC provide signals from GDTC0001 to outside air intake damper GDTZ0001A and recirculation damper GDTZ0001B, respectively, to change position based on room temperature. Damage to these cables could prevent operation of the dampers. Temperature controls for Train B ESW pump room are unaffected by a fire in area C-24.

Cable 11GDG01AC is associated with the indicator lights on Train A ESW pump room supply fan CGD01A hand switch GDHIS0001B. Damage to this cable could prevent operation of the

fan. Cables for Train B ESW pump room supply fan CGD01B are unaffected by a fire in this area.

Cable 11RPY10BA supplies 120 VAC control power to the automatic and manual start circuits in panel RP068 from NG01ACR1 for Train A ESW pump room supply fan CGD01A. Cables 11GDY01AA and 11GDY01AB are associated with the Train A ESW pump room supply fan CGD01A control circuit. Damage to these cables could prevent operation of the unit, which could prevent continuous operation of the Train A ESW pump. If this occurs, the Train B ESW pump room supply fan is unaffected by the fire.

PFSSD is assured for a fire in area C-24 using Train B ESW pump PEF01B and associated components.

References: E-15000, XX-E-013, E-093-00052, E-093-00053, E-13EF02, E-13EF03, E-13EF04, E-13EF05, E-13EF06, E-13EF07, E-13EF08, E-13EF09, E-13RP10, E-13EF11, E-K3EF08, E-K3GD01, E-K3GD04, E-1F9402A, E-1F9402B, E-1F9403, E-1F9424A, E-1F9443, E-K3EF01, J-201-00139, M-12EF01, M-12EF02, M-K2EF01, M-K2GD01

5.2.20 Component Cooling Water

For PFSSD, the component cooling water (CCW) system is used to provide cooling to the centrifugal charging pump (CCP) oil cooler, seal water heat exchanger, the RHR heat exchanger and the RHR pump seal cooler. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Cables associated with Train A CCW pumps PEG01A and PEG01C are run in this area. In addition, a cable associated with Train A CCW pump room cooler SGL11A is run in this area. Damage to these cables could prevent operation of the Train A CCW system.

Cables associated with a number of valves in the Train A CCW system are run in area C-24. These cables and associated valves are listed in Table C-24-3. Cables associated with valves in the Train B CCW system do not run in area C-24 and are unaffected by a fire in this area.

Valves BBHV0013, BBHV0014, BBHV0015, BBHV0016, EGHV0058, EGHV0061, EGHV0126 and EGHV0132 provide isolation capability for CCW flow to/from the RCP thermal barriers. Cables associated with these components are located in area C-24. If the valves fail to the open position, CCW would continue to flow to the RCP components, including the thermal barrier. This continued flow of water will not adversely impact PFSSD. If the valves fail to the closed position, CCW flow to the thermal barrier could be lost. This is acceptable since RCP seal injection is available.

Flow transmitters BBFT0017, BBFT0018, BBFT0019 and BBFT0020 are associated with valves BBHV0013, BBHV0014, BBHV0015 and BBHV0016, respectively. The flow transmitters monitor flow in the CCW piping and shut the valves on high CCW flow. Cables associated with these flow transmitters are run in this area. Damage to these cables could cause a spurious high CCW flow signal and close the valves. Damage to the valve cables could prevent re-opening the valves.

Cable 11EGI19AB is associated with CCW to RCP flow transmitter EGFT0128. Damage to this cable could prevent operators from diagnosing a loss of CCW flow to the RCP thermal barriers using flow indicator EGFI0128. CCW to RCP flow indicator EGFI0129 is unaffected by a fire in area C-18 and can be used to diagnose a loss of CCW flow to the RCP thermal barriers.

Based on the above discussion, a fire in area C-24 could affect CCW flow to/from the RCP thermal barriers. The Train B CCW system is available to supply cooling to the remaining

Train B PFSSD components. Loss of CCW flow to the RCP thermal barriers can be diagnosed using flow indicator EGFI0129. RCP seal injection is unaffected.

References: E-15000, XX-E-013, E-13BB03, E-13BB28, E-13EG01A, E-13EG01B, E-13EG05A, E-13EG05B, E-13EG09, E-13EG09A, E-13EG13, E-13EG16, E-13EG17A, E-13EG18, E-13EG19, E-13GL06, E-1F9303, E-1F9401A, E-1F9444, M-12EG01, M-12EG02, M-12EG03, M-12GL01

5.2.21 Residual Heat Removal System

PFSSD requires one train of residual heat removal (RHR) to be available for shutdown cooling. The RHR system is not used for hot standby. A number of cables associated with the RHR system run in area C-24. These cables are discussed in the following paragraphs.

Valve EGHV0101 is the Train A CCW to RHR Heat Exchanger control valve. Valve EGHV0102 is the Train B CCW to RHR Heat Exchanger control valve. These valves are normally closed during power operation. PFSSD requires that the valve on the operating train of CCW be closed until shutdown cooling mode is entered, at which time the valve on the operating train of RHR needs to be open. Cables 11EGG07AA, 11EGG07AB and 11EGG07AC are power and control cables associated with valve EGHV0101. Damage to cable 11EGG07AC could cause the spurious opening of the valve. Damage to all three cables could prevent operation when lining up for shutdown cooling. Valve EGHV0102 is unaffected by a fire in this area.

Cable 11EJB01AB is a control cable associated with Train A RHR pump feeder breaker NB00101. Damage to this cable could prevent operation of the pump from the control room or could cause the pump to spuriously operate. If the pump fails to operate, the Train B RHR pump is available. If the pump spuriously operates with no suction source, it will likely become damaged and the Train B RHR system will be used.

Cables 11EJG04AA, 11EJG04AB and 11EJG04AC are power and control cables associated with normally closed valve EJHV8804A. This valve is required to remain closed when aligning Train A RHR for cold shutdown. For hot standby, the valve can be in any position. Damage to these cables could cause the valve to open, which would cause flow diversion from Train A RHR to the charging pump suction header. Train B valve EJHV8804B is unaffected by a fire in area C-24.

Cables associated with normally closed valves EJHV8701A (Train A) and EJHV8701B (Train B) run in area C-24. These valves are required to be open when aligning the respective RHR Train for cold shutdown. Cable damage could prevent opening the associated valve from the control room. Therefore, a fire in area C-24 may require a cold shutdown repair to be made within 72 hours per 10CFR50, Appendix R or a containment entry to manually open EJHV8701B when using RHR Train B.

Cable 11EJG08AC, associated with Train A RHR pump mini-flow valve EJFCV0610, runs in area C-24. The mini-flow valve protects the Train A RHR pump during low-flow in the system. Damage to the cable could prevent operation of the valve. Cables associated with Train B RHR mini-flow valve EJFCV0611 do not run in area C-24. Therefore, the Train B RHR pump mini-flow valve is unaffected by a fire in area C-24.

The RHR pump discharge to RCS cold leg isolation valve (EJHV8809A or EJHV8809B) needs to be open on the operating train. Damage to cables 11EJG09CC and 11EJG09CD would likely result in valve EJHV8809A remaining in its as-is normally open position, which is the preferred PFSSD position. However, two proper intra-cable hot shorts in cable 11EJG09CD or one intra-cable hot short in cable 11EJG09CD combined with a short to ground on conductor 31 would spuriously close the valve.

Cable 15EJI12AA is an instrument AC power cable associated with Train A RHR flow control valve EJHCV0606. Cable 15RLY01DA supplies 120 VAC power from PN00736 to RL017/RL018 from PN0736, where the power splits and feeds EJHCV0606 via cable 15EJI12AA. Damage to these cables would cause a loss of power to the valve controller, failing the valve open, which is the desired position if using Train A RHR. Train B RHR flow control valve EJHCV0607 is unaffected by a fire in this area.

Based on the above discussion, a number of Train A RHR components could be affected by a fire in area C-24 but Train B RHR is unaffected.

References: E-15000, XX-E-013, E-13EG07, E-13EJ01, E-13EJ04A, E-13EJ04B, E-13EJ05A, E-13EJ05B, E-13EJ08, E-13EJ09A, E-13EJ12, E-13RL01, E-13RL04, E-1F9205, E-1F9301, E-1F9401A, M-12EJ01

5.2.22 Safety Injection Pumps

The PFSSD strategy is to prevent operation of the Safety Injection (SI) pumps to ensure an adequate supply of borated water in the RWST. One cable (11EMB01AB) associated with Train A SI pump is run in area C-24. Damage to this cable could cause the spurious start of the pump and could prevent stopping the pump from the control room.

If the Train A SI pump spuriously starts with the reactor at normal pressure, PFSSD will be assured. The pump will not discharge into the RCS due to the pressure differential between the RCS (approximately 2,235 psig) and the SI pump shutoff pressure (approximately 1,565 psig). In addition, the setpoint of the discharge relief valve (EM8853A) to the Recycle Holdup Tank is 1,825 psig. Therefore, no inventory will be lost from the RWST if the SI pumps spuriously start. With the SI pump operating at zero flow, damage to the pump could occur, which is a commercial concern only since the SI pump is not credited in the PFSSD analysis. If necessary, the pump can be stopped by opening breaker NB0103, but this action is not required for PFSSD.

Based on the above discussion, spurious operation of the Train A SI pump will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13EM01, E-1F9102, E-1F9302, M-12EM01, M-721-00096, WCRE-01

5.2.23 Boron Injection Tank Flow Path Valves

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

A fire in area C-24 uses CCP B, since circuits and support systems for CCP A may be affected by the fire. Also, based on the discussion in 5.2.37, a fire in area C-24 has the possibility to cause a momentary loss of inventory through the letdown flow path until the letdown isolation valves close automatically or are failed closed.

Train A BIT outlet valve EMHV8801A cable 11EMG02CF is run in this area. Cable 11EMG02CF is fire resistive and not susceptible to fire induced damage. Train A BIT inlet valve EMHV8803A may be affected by a fire in this area. Cable 11EMG02AC, associated with EMHV8803A, is run in this area. Damage to this cable could prevent opening the valve and

could prevent a flowpath from Train A CCP to the RCS via the BIT. Redundant Train B valve EMHV8803B is unaffected by a fire in this area so the Train B CCP flowpath to the RCS via the BIT is available.

The SIS test line is required to be isolated when charging through the BIT to prevent inventory loss. Either valve EMHV8964 or EMHV8871 is required to remain closed to prevent flow diversion through the SIS test line. Alternatively, both valves EMHV8843 and EMHV8882 can be closed to prevent flow. Cables associated with EMHV8964 and EMHV8882 are run in this area and the valves could open if damaged by a fire. Redundant valve EMHV8871 is unaffected by the fire and is available to ensure the SIS test line remains isolated.

Breaker PK6116 supplies power to a number of 125VDC loads on RL017/RL018 via cable 15RLK01DA. The only PFSSD load supplied by PK6116 is the control solenoid for valve EMHV8882. Valve EMHV8882 is the boron injection downstream test line and is required to be closed for PFSSD. De-energizing the control solenoid closes EMHV8882. Therefore, loss of power to the solenoid due to damage to cable 15RLK01DA will not impact PFSSD.

Based on the above discussion, charging through the BIT is unaffected by a fire in this area using Train B CCP and valves EMHV8801B and EMHV8803B. The SI test line can be isolated using valve EMHV8871.

References: E-15000, XX-E-013, E-13EM02, E-13EM02A, E-13EM02B, E-13EM02C, E-13EM05A, E-13EM12, E-13RL01, E-1F9302, M-12EM01, M-12EM02

5.2.24 Containment Spray Pumps

Spurious start of the containment spray (CS) pumps may complicate PFSSD due to the possible depletion of inventory in the RWST. Therefore, a spurious start of the CS pumps should be avoided or mitigated. A control cable (11ENB01AB) associated with Train A CS pump PEN01A runs through area C-24 and could cause a spurious start of the pump. The cable damage could prevent stopping the pump from the control room.

Normally closed valve ENHV0006 could open due to damage to associated control cables. If this occurs, water would flow from the containment spray nozzles, depleting inventory in the RWST.

The total flow in the containment spray system with one pump operating is 3,165 gpm (M-10EN). Based on calculation XX-E-013, Appendix 1, a maximum of 214,260 gallons of water can be lost from the RWST to maintain sufficient volume to achieve cold shutdown.

As stated previously, level indication in the RWST is available, so operators have the ability to diagnose a reducing RWST inventory. The time available to mitigate containment spray is:

214,260 gallons / 3,165 gpm = 67.7 minutes

A fire in this area could also result in the inability to isolate letdown, as discussed in Section 5.2.37. The maximum inventory loss through letdown is 195 gpm through all three orifice valves. If a multiple spurious operation scenario exists where containment spray spuriously operates concurrent with failed open letdown valves, the available time to mitigate this condition is as follows:

3,165 gpm + 195 gpm = 3,360 gpm

At this flowrate, the amount of time available to mitigate RWST inventory loss is:

214,260 gallons / 3,360 gpm = 63.7 minutes

Based on the above discussion, there is 63.7 minutes available to mitigate containment spray and failed open letdown, assuming letdown is isolated within 60 minutes. Pump PEN01A can be stopped by opening breaker NB0102 in fire area C-9. This is an OMA. Refer to E-1F9900 for details. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 16.

References: XX-E-013, E-15000, E-13EN01, E-13EN03, E-1F9102, E-1F9302, E-1F9424A, E-1F9433, M-10EN, M-12EN01

5.2.25 Safety Injection Accumulator Isolation Valves

PFSSD requires isolation of the SI accumulators prior to reducing RCS pressure below the injection pressure to avoid unnecessary accumulator discharge. This is accomplished by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. These valves are normally open with the MCC breaker administratively locked in the open position. Cables for valves EPHV8808A and EPHV8808C are run in area C-24.

Since the breakers for these valves are normally open, damage to these cables will not cause the valves to spuriously change position. However, damage to the cables will prevent closing the associated valve from the control room after power is restored.

The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig. If necessary, a containment entry can be made to manually close the valves.

References: E-15000, XX-E-013, M-12EP01, E-13EP02A, E-1F9201, CKL EP-120

5.2.26 Control Room Air Conditioning

Cables associated with Train A control room A/C unit SGK04A are run in this area. In addition, cables associated with SGK04A supply and return dampers GKHZ0029B and GKHZ0029A, respectively, are run in this area. Damage to these cables could prevent operation of the unit.

Cables associated with Train B control room A/C unit SGK04B are run in a separate area. Therefore, the Train B control room A/C unit is unaffected by a fire in this area.

References: XX-E-013, E-15000, E-13GK02A, E-13GK02B, E-13GK02C, E-13SA19, E-1F9442, M-12GK01, M-622.1A-00007

5.2.27 Class 1E Electrical Equipment Room A/C Unit

Power and control cables associated with Train A class 1E Electrical Equipment room A/C unit SGK05A are run in area C-24. A fire could damage these circuits and prevent operation of the unit. Circuits for Train B class 1E Electrical Equipment A/C unit SGK05B do not run in area C-24. Therefore, the Train B class 1E Electrical Equipment A/C unit is unaffected by a fire in this area.

Cables 15GKK31CA and 15GKK31CB are associated with the fire isolation signal on SGK05A. Damage to these cables could cause the unit to stop and prevent a re-start. Cable 15RPK09NA is the power cable from PK5126 to separation group 5 relays in RP330. Damage to this cable could cause a loss of power to relay 95XGK07 and shut down SGK05A. Fire isolation signal cables associated with Train B class 1E A/C unit SGK05B are unaffected.

Cable 11SAZ19KA provides status indication of Train A class 1E electrical equipment room A/C unit SGK05A at status panel SA066A. Damage to this cable could blow the control power fuse and prevent operation of SGK05A.

Based on the above discussion, Train B class 1E electrical equipment room cooling is available and is unaffected by a fire in area C-24.

References: XX-E-013, E-15000, E-13GK13, E-13GK31, E-13RP09, E-13SA19, E-1F9444, M-12GK03, M-622.1A-00002

5.2.28 Standby Diesel Generation

Cables 11NEB10AA and 11NEB10AD associated with Train A diesel generator to NB01 feeder breaker NB0111 are run in this area. Damage to these cables could prevent line up to the Train A diesel generator to the NB01 bus.

Calculation XX-E-013 documents a loss of off-site power evaluation that identifies the fire areas in and around the plant in which a fire could cause a loss of off-site and on-site power. Per XX-E-013 and Section 5.2.30 of this evaluation, a fire in area C-24 could cause a loss of off-site power on Train A. Train B off-site power and Train B diesel generator are unaffected by a fire in this area. Therefore, loss of the Train A diesel generator and off-site power to Train A will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-13NE10, E-1F9423

5.2.29 Containment Coolers

PFSSD requires containment cooling to maintain the containment environment within EQ limits. Cables associated with Train A containment coolers are run in area C-24. Damage to these cables could prevent operation of the Train A containment coolers if a fire occurs in this area. Circuits for the Train B containment coolers are run in a separate fire area and are unaffected by a fire in area C-24.

As discussed earlier, Train B ESW is available if a fire occurs in area C-24. Therefore, the Train B containment coolers will have the necessary service water flow to ensure proper operation.

References: E-15000, XX-E-013, E-13GN02, E-13GN02A, E-1F9441, M-12GN01

5.2.30 Class 1E 4.16 kV ESF Switchgear Bus

Several cables associated with class 1E 4.16 kV switchgear bus NB01 are located in this area. Damage to these cables could prevent operation of Train A equipment powered by NB01. Cables associated with class 1E 4.16 kV switchgear bus NB02 are located in a different fire area and are unaffected by a fire in area C-24.

Cable 15RLK01CA supplies 125 VDC power to panel RL013/RL014 from PK6115. The PFSSD function of RL013/RL014 is to allow isolation of off-site power to NB01 and NB02 in the event of a fire in areas C-9 and C-10, respectively. RL013/RL014 is not required for PFSSD if a fire occurs in area C-24. Therefore, damage to this cable will not adversely impact the ability to achieve and maintain PFSSD in the event of a fire in area C-24.

Cable 15RPK09RA supplies 125 VDC power to panel RP060 from PK5113. The PFSSD function of RP060 is to allow isolation of off-site power to NB01 and NB02 in the event of a fire in areas C-9 and C-10, respectively. RP060 is not required for PFSSD if a fire occurs in area C-24. Therefore, damage to this cable will not adversely impact the ability to achieve and maintain PFSSD in the event of a fire in area C-24.

References: XX-E-013, E-15000, E-13NB01, E-13NB02, E-13NB03, E-13NB10, E-13NB12, E-13NB13, E-13NG01A, E-13RL01, E-13RP09, E-1F9423, E-1F9425, E-1F9426

5.2.31 Train A 480 VAC Load Centers

Cables associated with 480 VAC load centers NG01, NG03 and NG05E are run in area C-24. Damage to these cables could de-energize the load centers and prevent operation of the associated Train A equipment.

Cables 11PKK10AA and 11PKK10AB are associated with the 125 VDC control circuit for breaker NG0102, which supplies 480 VAC power to battery charger PK021. Damage to these cables could prevent closing NG0102 and supplying power to PK021. Battery charger PK022 is unaffected by a fire in this area.

Train B 480 VAC load centers NG02, NG04 and NG06E are unaffected by a fire in this area and are available to supply power to redundant Train B equipment. Therefore, a fire in area C-24 will not impact the ability to supply power to required Train B 480 VAC equipment.

References: XX-E-013, E-15000, E-13NG01A, E-13NG10, E-13NG11, E-13PK10, E-1F9423, E-1F9424A, E-1F9424B, E-1F9424C, E-1F9424D, E-K3NG10

5.2.32 Class 1E 125 VDC Power to Main Control Boards

Several cables that supply class 1E 125 VDC power to the main control boards are run in area C-24. The cables run from the power supply to the control panel where the power is split to supply specific loads. The cables, power supply, control panel and affected PFSSD components are summarized in the following table.

CABLE	POWER SUPPLY	CONTROL PANEL	PFSSD EQUIPMENT	POSITION ON LOSS OF POWER	REQUIRED PFSSD POSITION
11RLK01AA	NK4119	RL001/002	BGHV8153A BGHV8154A	Closed Closed	Closed Closed
11RLK01CA	NK4112	RL017/018	EMHV8964	Closed	Closed
11RLK01DA	NK4113	RL019/020	EGTV0029 GMHZ0009	Closed Open	Closed Open
11RLK01EA	NK5109	RL021/022	BBHV8001A BBHV8002A	Closed Closed	Closed Closed

Based on the above table, the PFSSD equipment fails to the desired position upon loss of power. Therefore, damage to the cables will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13BB30, E-13BG48, E-13EG16, E-13EM12, E-13GM04, E-13RL01, E-13RL02, E-13RL03, E-13RL04, E-13RL05, E-13RL06, E-1F9301, E-1F9302, E-1F9401A, E-1F9422A, E-1F9444, M-12BB04, M-12BG01, M-12EG02, M-12EM01, M-12GM01

5.2.33 BOP Instrument Racks

BOP instrument racks RP053A, RP053B, RP053D and RP147 are credited in the PFSSD analysis. The following table identifies the PFSSD components served by each instrument rack.

Instrument Rack	PFSSD Components
RP053A (RP053AA, RP053AB, RP053AC)	ALHV0009 ALHV0011 ALPY037A EGFT0128 EGPSL0077 GDTSL0001 JELSL0001C
RP053B (RP053BA, RP053BB, RP053BC)	ALHV0007 ALPY0039A EGFT0129 EGPSL0078 GDTSL0011 JELSL0021C
RP053D (RP053DA, RP053DB)	ALPY0038A
RP147 (RP147A, RP147B)	ALHV0005

Cables 11RPY09CA and 11RPY09DA supply 120 VAC power to Train A BOP instrument rack RP053A. Damage to these cables could cause a loss of function of panel RP053A and associated PFSSD components.

Instrument racks RP053B, RP053D and RP147 are unaffected by the fire. Therefore, loss of PFSSD components associated with RP053A will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13AL08, E-13AL09, E-13EG13, E-13EG19, E-13JE01, E-13NN01, E-13RP09, E-1F9101, E-1F9202, E-1F9204, E-1F9401B, E-1F9411A, E-1F9411B, E-1F9424D, E-1F9443, E-K3GD04, M-12AL01, M-12EG01, M-12JE01, M-K2GD01, E-K3GD01A

5.2.34 Reactor Protection System

The Reactor Protection System (RPS) monitors specified input parameters and initiates reactor protection features whenever those parameters are outside specified limits. Field installed transmitters continuously monitor various parameters and report the results to one of four process cabinets, one per channel. Signals are then sent from the process cabinets to both solid state protection cabinets, one on each train. The cabinets and associated channel are listed in the following table.

Process Cabinets	Solid State Protection Cabinets
Cabinet SB038 - Channel 1 Cabinet SB042 - Channel 2 Cabinet SB037 - Channel 3 Cabinet SB041 - Channel 4	Cabinet SB029A - Train A Input Cabinet Cabinet SB029B - Train A Logic Cabinet Cabinet SB029C - Train A Output Cabinet 1 Cabinet SB029D - Train A Output Cabinet 2 Cabinet SB032A - Train B Input Cabinet Cabinet SB032B - Train B Logic Cabinet Cabinet SB032C - Train B Output Cabinet 1 Cabinet SB032D - Train B Output Cabinet 2

The RPS is actuated upon 2/3 or 2/4 coincident logic, depending on the input parameter. This ensures that a loss of a single channel will not prevent the system from performing its function.

Cables associated with RPS channel 1 run through this area. These cables supply power from separation group 1 power supplies to panels SB029A, SB029D, SB032A and SB038. Power cables associated with RPS channels 2, 3 and 4 are run in a separate fire area.

Cable 11SBS12AC is associated with reactor trip switchgear SB102A. Damage to this cable could cause a spurious reactor trip or could prevent an automatic or manual reactor trip on Train A. A tripped reactor is the desired PFSSD position. Train B reactor trip circuits are unaffected by a fire in this area so reactor trip can be accomplished on Train B.

Based on the above discussion, damage to RPS circuits due to a fire in area C-24 will not adversely impact the ability to achieve and maintain PFSSD.

References: XX-E-013, E-15000, E-11NK01, E-11NK02, E-13NN01, E-13SB01, E-13SB02, E-13SB05, E-13SB09, E-13SB12A, E-1F9101, E-1F9102, E-1F9431, E-1F9432, E-1F9433

5.2.35 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B.

Cable 11SES01AA is a power cable associated with panel SE054A, which is associated with SR monitor SENE0031. Cable 11SES07BB is an instrument cable associated with SENY0060B. Damage to these cables could prevent operation of the associated source range monitor or prevent source range indication in the control room. Source Range monitoring remains available for a fire in area C-24 using SENE0032 and SENY0061A/B.

For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013.

References: E-15000, XX-E-013, E-13NN01, E-13SE01, E-13SE05, E-13SE07, E-1F9101, E-1F9421

5.2.36 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

Cables 11NFK01CA and 11NFK01DA associated with one of the four undervoltage relays on each bus run in area C-24. Also, cables 11NFY01EA and 11NFY01FA associated with the degraded voltage PTs on each bus are run in fire area C-24. Cables associated with the remaining UV relays and PTs do not run in fire area C-24. Therefore, automatic functioning of

the bus NB01 and NB02 emergency load shed/sequencer is unaffected by a fire in area C-24 due to the availability of at least two UV relay inputs.

Separation group 1 power supply cables for load shedder/sequencer logic and input cabinets NF039A, NF039B and NF039C run in area C-24. Damage to these cables could cause a loss of Train A DC and AC power to the panels. Redundant Train B DC and AC power is available from separation groups 2 and 4 power supplies since separation groups 2 and 4 cables are located in a separate fire area.

Based on the above discussion, the load shedder/sequencer is not adversely affected by a fire in area C-24.

References: XX-E-013, E-15000, E-11NB01, E-11NB02, E-12NF01, E-13NF01, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, E-1F9402A, E-1F9402B, E-1F9403, E-1F9425, E-1F9426

5.2.37 Letdown Isolation Valves and Letdown Orifice Isolation Valves

Valves BGLCV0459 and BGLCV0460 are isolation valves installed in series on the inlet side of the regenerative heat exchanger. PFSSD requires that either of these valves or letdown orifice valves BGHV8149A, BGHV8149B, and BGHV8149C be closed.

Cables 15BGK10AA and 15BGK10AD are power/control cables for the BGLCV0459 solenoid valve (BGHY0459). Air supplied by an open (energized) solenoid valve will open valve BGLCV0459. A closed (de-energized) solenoid valve will cause loss of air pressure and closure of valve BGLCV0459.

Cables 15BGK10BA and 15BGK10BD are power/control cables for the BGLCV0460 solenoid valve (BGHY0460). Air supplied by an open (energized) solenoid valve will open valve BGLCV0460. A closed (de-energized) solenoid valve will cause loss of air pressure and closure of valve BGLCV0460.

Either BGLCV0459 or BGLCV0460 must be closed or letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C must be closed. The cables for BGLCV0459 or BGLCV0460 are routed in a common enclosure in cable trays. A hot short on the cables could cause the valves to open. A hot short on cables 15BGK10AA and 15BGK10BA prevents closing BGLCV0459 and BGLCV0460 from the control room. Other cables routed in the cable trays have the proper voltage for hot shorts which can bypass MCB handswitches for BGLCV0459 and BGLCV0460. BGLCV0459 and BGLCV0460 constitute a high/low pressure interface. Therefore, multiple simultaneous hot shorts must be considered.

Letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C are listed as PFSSD components because of the interlock between these valves and BGLCV0459 and BGLCV0460. The interlock prevents closure of the letdown valves when any one or more orifice isolation valves are open. Cables associated with all three letdown orifice isolation valves are located in this fire area. Damage to these cables could prevent closure of the valves from the control room. Therefore, a fire in area C-24 could prevent closure of all three letdown orifice isolation valves (BGHV8149A, BGHV8149B, and BGHV8149C) as well as the two letdown isolation valves (BGLCV0459 and BGLCV0460) using their respective hand switches in the control room.

Cable 15RLK01AA supplies 125 VDC power from breaker PK5117 to several non-safety related components on panel RL001/RL002. Some of these components are credited for PFSSD. These components are BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B and BGHV8149C. Damage to this cable will de-energize power to these valves, failing them closed which is the desired PFSSD position. If letdown is needed during cold shutdown, the excess letdown flowpath can be used or a cold shutdown repair made to restore normal letdown. Therefore, damage to this cable will not adversely impact PFSSD.

Valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B, and BGHV8149C are air operated and fail in the closed position. The valves are located in containment. Instrument air to containment is controlled by valve KAFV0029, which is unaffected by a fire in area C-24. Therefore, hand switch KAHIS0029 can be used to close the valve from the control room and isolate instrument air to containment. Pressurizer level indication is available using BBLI0460A.

Based on the above discussion, letdown valves BGLCV0459 and BGLCV0460 and letdown orifice valves BGHV8149A, BGHV8149B, and BGHV8149C can be closed from the control room if a fire occurs in area C-24.

References: E-15000, XX-E-013, E-13BG10, E-13BG35, E-13KA02, E-13SC12, E-1F9301, M-12BG01, M-12KA01

5.2.38 Steam Generator Blowdown to Blowdown Flash Tank Isolation Valves

Blowdown valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 are required to be closed for PFSSD. The valves are air operated, and each valve is controlled by three solenoid valves. All three solenoid valves are required to be energized to open the valve. If any one solenoid is de-energized, the associated valve will close or remain closed. Only two of the three solenoids for each valve are considered in the PFSSD analysis, so the third solenoid is assumed energized throughout the event.

Cable 15BMK16AA is the 125 VDC power feed to BM157. Damage to this cable could impact the ability to close the valves from BM157 in the Radwaste Control Room.

Cable 15RPK09EA supplies non-class 1E 125 VDC power to panel RP211 from PK5129. Loss of power to the relay panel will result in loss of power to relay 3XBM46. The function of this relay is to close valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004 if a blowdown and sample process isolation signal is received. Under normal conditions the relay is de-energized, the auxiliary contacts are closed, and valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004 are open. Damage to cable 15RPK09EA could result in the relay remaining de-energized which would prevent a blowdown and sample process isolation signal from closing the valves.

The normal means of closing the blowdown valves using panel RL024 mounted handswitches BMHIS0001A, BMHIS0002A, BMHIS003A and BMHIS0004A in the main control room is unaffected. Therefore, a fire in area C-24 will not prevent the closure of valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004.

References: E-15000, XX-E-013, E-093-00028, E-13BM04, E-13BM06A, E-13BM06B, E-13BM06C, E-13BM06D, E-13BM16, E-13RP09, E-1F9101, E-1F9422A, E-1F9422C, M-12BM01

5.2.39 Non-Class 1E 120 VAC Electrical Distribution System

The PFSSD function of the non-Class 1E 120 VAC electrical distribution system is to supply 120 VAC power to Main Control Boards (MCBs) RL017/RL018 and RL021/RL022. The power is split at the MCB to supply specific PFSSD components. Power is supplied to respective loads from switchboards PN07 and PN08.

Cable 15PNY01AR provides an alternate power feed to switchboard PN07 from PG19GFR3. Damage to this cable will result in a loss of the alternate power feed to PN07. The primary source of power to PN07 from transformer XPN07A could also be affected due to the loss of NG01, as discussed in Section 5.2.31. Therefore, PN07 may not be available if a fire occurs in this area.

Switchboard PN08 is unaffected by a fire in this area. Loss of PN07 will have no adverse impact on PFSSD due to the availability of PN08.

References: XX-E-013, E-15000, E-13PN01, E-13PN01A, E-1F9201, E-1F9205, E-1F9421

5.2.40 Control Room Emergency Lights

Emergency lighting is provided in the control room to ensure adequate lighting during a station blackout and in the event a fire damages cables associated with the normal and standby lighting system. Emergency lights are supplied power from Class 1E 125 VDC breaker NK5120.

The control room has four sources of lighting; 1) Normal (QA); 2) Standby (QB); 3) Emergency (QD); and 4) Self-contained battery units. The normal lighting system is not evaluated in the PFSSD analysis and is assumed lost.

Cable 11QDK01AA is a 125 VDC power cable that runs from NK051A to the control room emergency lights. Damage to this cable will prevent operation of the emergency lights.

Self-contained Appendix R battery units are provided in the control room to provide minimum lighting for post-fire safe shutdown. Three units are provided in the front panel area, each with two light heads, to provide illumination on the main control boards. Two additional units are provided in the corridor area and two units are provided in the back panel area, each with two light heads. The Appendix R battery units are capable of providing minimum illumination for 8 hours, during which time action can be taken by maintenance to restore the normal or standby lighting system.

Based on the above discussion, sufficient lighting exists in the control room to achieve and maintain PFSSD.

References: E-15000, XX-E-013, E-093-00064, E-11NK01, E-13QD01, E-1F9422A, E-1L3604, E-1L8900

5.2.41 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs.

One control cable associated with reactor coolant pumps A and B is run in fire area C-24. Damage to these cables in the event of a fire could prevent operators from stopping the A and B RCPs from the control room. However, a fire in C-24 will not cause a loss of all seal cooling since RCP seal injection remains available.

Based on the above discussion, the inability to trip the A and B RCPs from the control room will have no adverse impact on PFSSD. The pumps can continue to operate, providing forced flow circulation. If the pumps spuriously stop, natural circulation cooldown can be used.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1

5.2.42 Normal Pressurizer Spray

The normal pressurizer spray valves are included in the PFSSD design because spurious operation of pressurizer sprays can cause a decrease in pressure which can lead to boiling in the core. The pressurizer spray valves are part of the pressurizer pressure control system.

The pressurizer normal spray valves (BBPCV0455B and BBPCV0455C) operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

Cable 11BBI16KB associated with BBPT0455 is run in this area. Damage to this cable could cause a spurious high-pressure signal. As discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure input channel will not cause the spurious operation of the pressurizer spray valves due to the Ovation 4-channel validation logic, which uses the 2nd highest signal as the validated signal and has built-in logic to detect and ignore a failed input.

Cable 15BBI19AA associated with pressurizer spray valve BBPCV0455B, and cable 15BBI19BA associated with pressurizer spray valve BBPCV0455C are run in this area. Damage to these cables could cause the spurious opening of the spray valves.

The pressurizer spray valves are electro/pneumatic operated and loss of air pressure will close the valves. The air supply comes from the compressed air system. Closing valve KAFV0029 using KAHIS0029 on RL024 will isolate compressed air to containment which will cause the pressurizer spray valves to close or prevent them from opening. Based on WCNOC-CP-002, spray flow needs to be stopped within 50 minutes. Since this is a control room action, this can be completed well within 50 minutes.

Based on the above discussion, the pressurizer spray valves could spuriously open if a fire occurs in this area. Pressurizer spray can be stopped by closing valve KAFV0029 from the main control room. Pressurizer pressure indication is available using BBPI0456, BBPI0457 and BBPI0458.

References: E-15000, XX-E-013, E-13BB19, E-13KA02, E-1F9304, M-744-00028, M-761A-00063, DCP 13324

5.2.43 Steam Generator Feedwater Pumps

Main feedwater pump steam supply valves FCFV0005 and FCFV0105 are credited in the PFSSD analysis to trip the main feedwater pumps if the main steam isolation valves (MSIVs) are affected by a fire. Closing the MSIVs stops steam flow to the feedwater pumps' turbines and stops the feedwater pumps. The steam generator feedwater pumps are tripped in the event of a fire to prevent overfilling the steam generators.

Non-Class 1E 120 VAC Inverter PN09 and distribution panel PN09A provide power to FCFV0005 trip relays in panel FC169C. Cable 15FCY35AA provides the primary source of 120 VAC power from distribution panel PN09A to panel FC169A, which distributes power to the trip relays in panel FC169C. The alternate source of power to panel FC169A is not credited for PFSSD and is assumed lost.

A fire in area C-24 could damage cable 15FCY35AA. If this occurs, operators in the control room would not be able to close valve FCFV0005 to stop steam flow to steam generator feedwater pump PAE01A.

A fire in area C-24 will not affect the ability to close the MSIVs from the control room. All-close hand switch ABHS0079 is unaffected and can be used to close the MSIVs from the control room.

Based on the above discussion, valve FCFV0005 may not close if a fire occurs in this area. However, the MSIVs can be closed using hand switch ABHS0079 in the main control room. Therefore, the configuration is acceptable.

References: E-15000, XX-E-013, E-13FC35, E-1F9103, E-1F9421

5.2.44 Load Center Feeder Breakers PA0105 and PA0106 and Load Center PG19 Incoming Feeder Breaker PG1901

Load center feeder breakers PA0105 and PA0106 are credited for PFSSD because they supply power to credited non-safety related loads. Cables 15PGA10AA, associated with PA0105, and 15PGA10BA and 15PGA10BB associated with PA0106, run in this area. Cables 15PGG13DA and 15PGG13DC associated with PG1901 are also run in this area. A fire induced short circuit in these cables will trip the associated breaker.

Breaker PA0105 supplies power to the following PFSSD components:

- PG11JFR2 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0031
- PG11KBR3 – Auxiliary Steam System Control Valve FBHV0081

PG11JFR2 and PG11KBR3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using hand switch ABHS0079. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Based on the above discussion, loss of breaker PA0105 will not adversely affect PFSSD if a fire occurs in this area.

Breakers PA0106 and PG1901 supply power to the following PFSSD components:

- PG19GCR217 – MCB Misc. Power Circuits RL023
- PG19GFR3 – Instr. Bus Transformer Alt. Feed XPN07D

PFSSD components supplied power from PG19GCR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed

from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG19GFR3 is credited as the backup source of power to PN07. The primary source of power to PN07 is from NG01BEF4. As discussed in Section 5.2.31 the primary source of power to PN07 could also be affected. However, as discussed in Section 5.2.39, switchboard PN08 is available to supply power to redundant PFSSD loads.

Based on the above discussion, loss of breakers PA0105, PA0106 or PG1901 will not adversely affect PFSSD if a fire occurs in this area.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-13PG10, E-1F9424E, KD-7496, DCP 13324

5.2.45 120 VAC Distribution Panel PN310

120 VAC distribution panel PN310 supplies power to NSSS control panels RP043 and RP047.

Inverter PN03 supplies power to 120 VAC distribution panel PN310 (via cables 15PNY02AA and 15PNY02AB), which in turn supplies redundant 120 VAC power to NSSS control cabinets RP043 and RP047. For PFSSD, cabinet RP043 houses relays BGLCV0459X and BGLCV0460X, which are associated with letdown isolation valves BGLCV0459 and BGLCV0460, respectively. Cabinet RP047 includes controls for pressurizer PORVs and pressurizer spray.

Damage to cables 15PNY02AA and/or 15PNY02AB will disrupt power to panel PN310. Redundant power to RP043 and RP047 is available from 120 VAC distribution panel PN410. Therefore, loss of power to PN310 will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-1F9421, DCP 13324

FIRE AREA C-25

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-25 is located on the 2032 elevation of the Control Building and includes the room listed in Table C-25-1.

Table C-25-1
Rooms Located in Fire Area C-25

ROOM #	DESCRIPTION
C25	South Small Elec Chase 2032 Elevation

Fire area C-25 is protected with an automatic fire suppression and detection system. The area is bounded on all sides by minimum 3-hour fire rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-25-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-25-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-25

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	It may be necessary to isolate SG B ARV using local control station ABFHC0002. Steam generators A, C and D ARVs are unaffected. Steam line pressure transmitters ABPT0515, ABPT0525, ABPT0535, ABPT0545 may be affected. The remaining steam line pressure transmitters are unaffected. Valves ABHV0005 and ABHV0006 could be affected, preventing operation of the turbine driven auxiliary feedwater pump. Both motor driven auxiliary feedwater pumps are available.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
AE	Main Feedwater	H, P	Steam generator B wide range water level transmitter AELT0502 may be affected. Remaining steam generator level transmitters are unaffected.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. The turbine driven auxiliary feedwater pump (TDAFP) may not be available. The motor driven auxiliary feedwater pumps are unaffected.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
BB	Reactor Coolant System	R, M, H, P, S	Pressurizer level transmitter BBLT0460 may be affected. Redundant pressurizer level transmitter BBLT0459 is unaffected. RCS Temperature elements BBTE0413B, BBTE0423B, BBTE0433A and BBTE0443A, as well as associated temperature indicators, could be affected by a fire in this area. The remaining temperature elements/indicators are unaffected. Pressurizer pressure transmitter BBPT0456 may be affected. The remaining pressurizer pressure transmitters are unaffected. When transferring to RHR, valve BBPV8702A or BBPV8702B may need to be manually opened to provide a suction source from the RCS to RHR pump A or B. Pressurizer pressure indication is available using BBPI0455A, BBPI0457 or BBPI0458.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.

Table C-25-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-25

System	System Name	PFSSD Function*	Comments
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
EJ	Residual Heat Removal System	M, H, P	Both trains of RHR are available. However, as discussed in the BB system comments, it may be necessary to manually open BBPV8702A or BBPV8702B.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
FC	Auxiliary Turbines	R, H, P	The TDAFP speed control valve FCFV0313 and trip and throttle valve FCHV0312 could be affected. The motor driven auxiliary feedwater pumps are available.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.

Table C-25-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-25

System	System Name	PFSSD Function*	Comments
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
GN	Containment Coolers	S	Containment pressure transmitter GNPT0936 may be affected. The remaining containment pressure transmitters are unaffected.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
NF	Load Shed and Emergency Load Sequencing	S	All PFSSD functions associated with load shed/emergency load sequencing system are satisfied. Separation group 2 power supply cables for load shedder/sequencer logic and input cabinets NF039A and NF039B could be affected. Redundant AC power is available from separation groups 1, 3 and 4 power supplies.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.

Table C-25-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-25

System	System Name	PFSSD Function*	Comments
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
RP	Miscellaneous Control Panels	R, M, H, P, S	Power to lockout relays 86XRP1, 86XRP2 and 86XRP3 could be affected. This will not impact PFSSD.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
SB	Reactor Protection System	R, S	RPS Channel 2 could be affected. RPS Channels 1, 3 and 4 are unaffected.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
SE	Ex-Core Neutron Monitoring	R, P	Source range monitor SENE0032B could be affected. Source range monitoring remains available using SENI0031B, SENI0060A/B and SENI0061A/B.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-25.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-25. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs

If damage occurs to cables associated with ABPV0002, local control station ABFHC0002, located in room 1509, can be used to close ARV ABPV0002.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 Residual Heat Removal

It may be necessary to either perform a cold shutdown repair or manually open valve BBPV8702A or BBPV8702B when transitioning to RHR.

4.0 CONCLUSION

Redundant post-fire safe shutdown capability is unaffected by a fire in area C-25.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-25.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-25

There are no PFSSD components located in fire area C-25. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-25-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-25. The applicable evaluation section is also listed in Table C-25-3.

Table C-25-3
PFSSD Cables Located in Fire Area C-25

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12ABI20FE	C25	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FG	C25	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FH	C25	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FJ	C25	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FK	C25	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FL	C25	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FM	C25	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FN	C25	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI21KA	C25	ABPT0515	I	5.2.7	SG A Steam Pressure
12ABI21NA	C25	ABPT0525	I	5.2.7	SG B Steam Pressure
12ABI21SA	C25	ABPT0535	I	5.2.7	SG C Steam Pressure
12ABI21VA	C25	ABPT0545	I	5.2.7	SG D Steam Pressure
12ABK01AD	C25	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12ABK01AE	C25	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12ABK01AF	C25	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12ABK01AG	C25	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12ABK01BD	C25	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12ABK01BE	C25	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12ABK01BF	C25	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12ABK01BG	C25	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12AEI08EB	C25	AELT0519	I	5.2.3	SG A Narrow Range Water Level
12AEI08FB	C25	AELT0549	I	5.2.3	SG D Narrow Range Water Level
12AEI08GB	C25	AELT0502	I	5.2.3	SG B Wide Range Level Indication

Table C-25-3
PFSSD Cables Located in Fire Area C-25

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12AEI12BB	C25	AELT0552	I	5.2.3	SG B Narrow Range Water Level
12AEI12CB	C25	AELT0553	I	5.2.3	SG C Narrow Range Water Level
12ALI07KD	C25	ALPT0026	I	5.2.1	TDAFP Suction Pressure Transmitter
12ALI07KE	C25	ALPI0026B	I	5.2.1	TDAFP Suction Pressure Indicator at RP118B
12ALI07KF	C25	ALPI0026A	I	5.2.1	TDAFP Suction Pressure Indicator at RL005
12ALI08BA	C25	ALPT0038	I	5.2.1	ESFAS Low Suction Pressure Transmitter
12BBI15EB	C25	BBTE0413B	I	5.2.3	RCS Cold Leg Temp Element (WR) Loop 1
12BBI15HB	C25	BBTE0423B	I	5.2.3	RCS Cold Leg Temp Element (WR) Loop 2
12BBI15JB	C25	BBTE0443A	I	5.2.3	RCS Hot Leg Temp Element (WR) Loop 4
12BBI15KB	C25	BBTE0433A	I	5.2.3	RCS Hot Leg Temp Element (WR) Loop 3
12BBI15NB	C25	BBPT0403	I	5.2.4	RCS Pressure Wide Range
12BBI16LB	C25	BBPT0456	I	5.2.7 5.2.8	Pressurizer Pressure Transmitter
12BBI16QB	C25	BBLT0460	I	5.2.3	Pressurizer Level Transmitter (Narrow Range)
12FCK23AA	C25	FCHV0312	C	5.2.1	TDAFP Trip and Throttle Valve
12FCK23AR	C25	FCHV0312	P	5.2.1	TDAFP Trip and Throttle Valve
12FCK23AS	C25	FCHV0312	C	5.2.1	TDAFP Trip and Throttle Valve
12FCK23AU	C25	FCHV0312	P	5.2.1	TDAFP Trip and Throttle Valve
12FCK24AK	C25	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12FCK24AL	C25	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12FCK24AM	C25	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12FCK24AN	C25	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12FCK24AP	C25	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve

Table C-25-3
PFSSD Cables Located in Fire Area C-25

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12FCK24AQ	C25	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12GNI05BA	C25	GNPT0936	I	5.2.7	Containment Pressure Transmitter
12NFK01CA	C25	NF039A	C	5.2.2	Load Shedder / Emergency Load Sequencer
12NFK01DA	C25	NF039B	C	5.2.2	Load Shedder / Emergency Load Sequencer
12NFY01CA	C25	NF039A	P	5.2.2	120 VAC Power to NF039A from NN0206
12NFY01DA	C25	NF039B	P	5.2.2	120 VAC Power to NF039B from NN0204
12NFY01EA	C25	NF039A	C	5.2.2	Load Shedder / Emergency Load Sequencer
12NFY01FA	C25	NF039B	C	5.2.2	Load Shedder / Emergency Load Sequencer
12RLK01AA	C25	RL005/RL006	P	5.2.1	Turbine Generator & Feedwater Control Panel
12RPK09AA	C25	FCFV0313	P	5.2.1	TDAFP Speed-Governing Valve
12RPK15AA	C25	FCHV0312	C	5.2.1	TDAFP Trip and Throttle Valve
12RPK15BA	C25	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12RPK15CA	C25	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12RPY09AA	C25	RP053DA	P	5.2.1	120 VAC to BOP Instrumentation Rack from NN0208
12SAK21CA	C25	SA036C	P	5.2.1	125 VDC to ESFAS Channel 2 Term Cab from NK4205
12SAY21CA	C25	SA036C	P	5.2.1	120 VAC to ESFAS Channel 2 Term Cab from NN0205
12SAZ23AA	C25	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12SAZ23BA	C25	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12SBS01BD	C25	SB029A	P	5.2.5	120 VAC to SSPS A Input Panel from NN0210
12SBS02BD	C25	SB032A	P	5.2.5	120 VAC to SSPS B Input Panel from NN0209
12SBS16AA	C25	AELI0502A	I	5.2.3	Steam Generator B Wide Range Water Level

Table C-25-3
PFSSD Cables Located in Fire Area C-25

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12SBS16BA	C25	BBTI0423X	I	5.2.3	RCS Cold Leg Loop 2 Temperature
12SBS16GA	C25	BBLI0460B	I	5.2.3	Pressurizer Level Narrow Range
12SBS16HA	C25	BBTI0443A	I	5.2.3	RCS Hot Leg Loop 4 Temperature
12SBY09DA	C25	SB042	P	5.2.5	120 VAC to Process Protection Set 2 Panel from NN0212
12SES02AA	C25	SE054B	P	5.2.6	120 VAC to Nuclear Instrument Panel from NN0211
12SES02BB	C25	SE0032	I	5.2.6	Source Range Monitor
12SES02BC	C25	SE0032	I	5.2.6	Source Range Monitor

5.2.1 Auxiliary Feedwater and Steam Generator Atmospheric Relief Valves

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. Atmospheric relief valves on the two steam generators being fed need to be controlled and atmospheric relief valves on the remaining two steam generators need to be closed. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire auxiliary feedwater (AFW) demand to achieve cold shutdown.

Cables associated with ABHV0005, ABHV0006, FCHV0312 and FCFV0313 are run in area C-25. Damage to these cables could either cause all four valves to spuriously open at the same time, causing uncontrolled blowdown through the TDAFP, or prevent operation of one or more valve, preventing operation of the TDAFP. Uncontrolled cooldown is mitigated by FCHV0312 tripping on high speed. The Train A and Train B MDAFPs are available to supply feedwater to all four steam generators.

A number of cables associated with steam generator B ARV ABPV0002 are run in this area. Damage to these cables could cause the ARV to spuriously open and could prevent control from the control room. If this occurs, operators may need to control or close ABPV0002 using local controller ABFHC0002 in room 1509.

Cable 12RLK01AA supplies power to RL005/RL006 from switch NK4206. The PFSSD components on RL005/RL006 supplied by NK4206 are ABHV0005 and ABHV0006. Loss of power will fail the valves open, which is desired for operation of the turbine driven auxiliary feedwater pump (TDAFP).

Cable 12RPY09AA supplies 120 VAC power from NN0208 to BOP instrument rack RP053DA. Damage to this cable will affect the following PFSSD components:

- ALPY0038A - ESFAS LOW SUCTION PRESSURE SIGNAL CONVERTER
- ALPT0038 - ESFAS LOW SUCTION PRESSURE TRANSMITTER
- ABPIC0002A - STM GEN B ATM STEAM DUMP PRESSURE CONTROLLER
- ABHS0002 - ABPV0002 HANDSWITCH
- ALPI0026A - TDAFW PUMP PAL02 SUCTION PRESSURE

Low suction pressure (LSP) on 2 out of 3 AFW pressure transmitters (ALPT0037, ALPT0038 and ALPT0039) coincident with an auxiliary feedwater actuation signal (AFAS) will swap the AFW supply to ESW. Loss of power to ALPT0038 and ALPY0038A will satisfy 1/3 LSP logic, placing the LSP signal logic in a 1 out of 2 configuration. In addition, damage to cable 12ALI08BA will prevent operation of ALPT0038 but ALPT0037 and ALPT0039 are unaffected. Therefore, low suction pressure or loss of power on ALPT0037 or ALPT0039 will provide the permissive to swap if an AFAS is present.

Loss of power to ABPIC0002A and ABHS0002 could prevent operation of steam generator B ARV ABPV0002 from the control room. If this occurs, operators may need to control or close ABPV0002 using local controller ABFHC0002 in room 1509.

Loss of power to ALPI0026A will provide false indication of TDAFP suction pressure. In addition, other cables (12ALI07KD, 12ALI07KE and 12ALI07KF) associated with pressure transmitter ALPT0026 are located in this area. Damage to these cables will prevent indication of TDAFP suction pressure. The transmitter does not initiate any automatic functions and the

TDAFP is not credited for a fire in this area. Train A and Train B MDAFP suction pressure indicators are unaffected.

Panel SA036C monitors pressure transmitter signals on ALPT0038 and provides AFAS outputs. Power cables 12SAK21CA and 12SAY21CA associated with SA036C are run in this area. Damage to these cables could result in a loss of power to the panel but will not prevent automatic operation of low suction pressure (LSP) swapover since the remaining 2 channels are available. AFAS is not credited for PFSSD but is analyzed for potential adverse impacts.

Based on the above discussion, the TDAFP may be affected but both MDAFPs are available to provide feedwater to the steam generators. Steam generator B ARV ABPV0002 may need to be controlled or closed using local controller ABFHC0002. Uncontrolled blowdown through the TDAFP is mitigated by FCHV0312 automatically tripping on high speed.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: XX-E-013, E-15000, E-13AB01, E-13AB01A, E-13AB20B, E-13FC23, E-13FC24, E-13RL01, E-13RP09, E-13RP15, E-1F9101, J-02AB01, J-02AB03, J-110-00348, J-110-00590, J-110-00642, J-110-00647, J-110-00938, J-110-00942, M-12AB01, M-12AB02, M-12FC02

5.2.2 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

The outputs from each safeguards bus (NB01 and NB02) are divided into 4 separation groups; 1, 2, 3 and 4 and routed to two control panels, NF039A and NF039B. The input section of each control panel also receives group 1, 2, 3 and 4 instrument power (120VAC). The inputs then pass through isolation devices, at which point all inputs to NF039A become separation group 1 and all inputs to NF039B become separation group 4. Interruption of either the inputs or the instrument power from one separation group would impact the associated input channel but would not impact the other 3 input channels.

Cable 12NFY01CA supplies 120 VAC power to LSELS panel NF039A. Cable 12NFY01DA supplies 120 VAC power to LSELS panel NF039B. Panels NF039A and NF039B have four sources of Class 1E 120 VAC power, each from separate 120 VAC distribution switchboards, two on Train A and two on Train B. The LSELS system operates when a degraded voltage condition exists on 2 out of 4 sensors on a single 4,160-Volt Class 1E bus. Loss of one source of AC power to each panel will have no adverse impact on PFSSD since 120 VAC power remains available from the remaining three sources.

Cables 12NFK01CA and 12NFK01DA are associated with separation group 2 UV relays on buses NB01 and NB02, respectively. Cables 12NFY01EA and 12NFY01FA are associated with separation group 2 degraded voltage PTs on buses NB01 and NB02, respectively. Cables associated with the remaining three UV relays and PTs from separation groups 1, 3 and 4 do not run in fire area C-25.

Automatic functioning of the bus NB01 and NB02 emergency load shedder / sequencer is unaffected by a fire in area C-25 because of the presence of circuits for only one of the four load shed/sequencer initiators. Therefore, a spurious start of the Train A and Train B diesel generators due to a false undervoltage condition on two of the four circuits is not credible.

Based on the above discussion, the Train A and Train B load shed/sequencers are available if a fire occurs in this area. Off-site power to both trains is unaffected based on Calculation XX-E-013, Appendix 2.

References: XX-E-013, E-15000, E-11005, E-13NF01, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, J-104-00347

5.2.3 Process Monitoring

Process monitoring is required to achieve and maintain safe shutdown. Some of the process instruments credited for safe shutdown could be affected by a fire in area C-25. These instruments, as well as the available redundant capability, are described in the following paragraphs.

Steam generator level indication is required to support the decay heat removal function. Each steam generator has one wide range and four narrow range level transmitters. At least one level transmitter is required on each steam generator being used for heat removal. Cables 12AEI08GB, 12AEI08EB, 12AEI08FB, 12AEI12BB and 12AEI12CB associated with AELT0502 (SG B WR), AELT0519 (SG A NR), AELT0549 (SG D NR), AELT0552 (SG B NR) and AELT0553 (SG C NR), respectively, are run in fire area C-25. Cables for the remaining level transmitters are not run in fire area C-25. Therefore, at least one level indicator on all four steam generators is available.

RCS hot and cold leg temperature indication is required on at least one loop to verify sufficient flow through the steam generators to ensure RCS decay heat removal. The following table lists the RCS temperature elements credited for PFSSD.

RCS Hot and Cold Leg Temperature Elements Used for PFSSD	
COMPONENT	**FUNCTION**
BBTE0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	RCS Cold Leg Temperature Element (WR) Loop 4

Temperature elements BBTE0413B, BBTE0423B, BBTE0433A and BBTE0443A, as well as associated temperature indicators, could be affected by a fire in this area due to damage to cables 12BBI15EB, 12BBI15HB, 12BBI15JB, 12BBI15KB, 12SBS16BA and 12SBS16HA. The remaining temperature elements/indicators are unaffected. Therefore, RCS hot and cold leg

temperature indication on a single loop could be affected, which does not meet the PFSSD logic identified on drawing E-1F9201.

Procedure EMG ES-04, Attachment B Section B1 provides alternate indication in the control room that may be used to verify natural circulation flow. One of these methods verifies that steam generator pressure is stable or decreasing. Based on Section 5.2.1, cooldown is assured using loops 1, 3 and 4. Based on Section 5.2.7, steam generators A, C and D pressure indication is available. These pressure instruments, along with their respective indicators in the control room, can be used, per EMG ES-04, to verify heat removal in loops 1, 3 and 4.

The configuration is acceptable because, in the event of a fire in area C-25, cooldown can be performed using RCS loops 1, 3 and 4. RCS temperature elements BBTE0413A, BBTE0433B and BBTE0443B as well as steam generator pressure transmitters ABPT0514 or ABPT0516 (Loop 1), ABPT0534 or ABPT0536 (Loop 3) and ABPT0544 or ABPT0546 (Loop 4) will provide indication of flow through the steam generators.

Pressurizer level indication is required to be available to ensure sufficient make-up inventory is provided to compensate for RCS fluid shrinkage during cooldown and losses from the system. Pressurizer level indication is provided by level transmitters BBLT0459 and BBLT0460. Cable 12SBS16GA associated with BBLT0460 is run in area C-25, so BBLI0460 may not be available. Cables for BBLT0459 do not run through fire area C-25 and are unaffected by a fire. Therefore, pressurizer level indication is available for a fire in area C-25 using BBLI0459A.

Based on the above discussion, process monitoring is available if a fire occurs in fire area C-25.

References: E-15000, XX-E-013, E-13AE08, E-13AE12, E-13BB15, E-13BB16, E-13SB16, E-1F9201, E-1F9203, E-1F9301, M-12AE02, M-12BB01, M-12BB02

5.2.4 Residual Heat Removal

Hot shutdown mode of PFSSD requires isolation of the RCS to RHR flow path by maintaining either BBPV8702A or EJHV8701A closed and either BBPV8702B or EJHV8701B closed. Cold shutdown mode of PFSSD requires RHR taking suction from the RCS. RHR pump suction from the RCS is controlled by valves BBPV8702A and EJHV8701A (Train A) and BBPV8702B and EJHV8701B (Train B). Both trains of RHR are available if a fire occurs in this area.

Damage to cable 12BBI15NB, associated with pressure transmitter BBPT0403, could initiate a false High-1 RCS pressure signal and open the contacts on relay K734. This false High-1 pressure signal would prevent remote opening of valves BBPV8702A and BBPV8702B. Therefore, a fire in this area may require a cold shutdown repair or a containment entry to open valve BBPV8702A or BBPV8702B prior to initiating RHR for cold shutdown.

Based on the above discussion, RHR is available using either train but suction from the RCS may need to be manually aligned prior to starting the RHR pumps.

References: E-15000, XX-E-013, E-13BB12A, E-13BB12B, E-13BB15, E-1F9205, M-12BB01

5.2.5 Reactor Protection System

The Reactor Protection System (RPS) monitors specified input parameters and initiates reactor protection features whenever those parameters are outside specified limits. Field installed transmitters continuously monitor various parameters and report the results to one of four process cabinets, one per channel. Signals are then sent from the process cabinets to both solid state protection cabinets, one on each train. The cabinets and associated channel are listed in the following table.

Process Cabinets	Solid State Protection Cabinets
Cabinet SB038 - Channel 1 Cabinet SB042 - Channel 2 Cabinet SB037 - Channel 3 Cabinet SB041 - Channel 4	Cabinet SB029A - Train A Input Cabinet Cabinet SB029B - Train A Logic Cabinet Cabinet SB029C - Train A Output Cabinet 1 Cabinet SB029D - Train A Output Cabinet 2 Cabinet SB032A - Train B Input Cabinet Cabinet SB032B - Train B Logic Cabinet Cabinet SB032C - Train B Output Cabinet 1 Cabinet SB032D - Train B Output Cabinet 2

The RPS is actuated upon 2/3 or 2/4 coincident logic, depending on the input parameter. This ensures that a loss of a single channel will not prevent the system from performing its function.

Cables 12SBS01BD, 12SBS02BD and 12SBY09DA associated with reactor protection system channel 2 run through this area. These cables supply power from separation group 2 power supplies to panels SB029A, SB032A and SB042. Damage to these cables could cause a loss of RPS channel 2, but channels 1, 3 and 4 remain available. Therefore, the RPS is available if a fire occurs in this area.

References: XX-E-013, E-15000, E-13NN01, E-13SB01, E-13SB02, E-13SB03, E-13SB04, E-13SB05, E-13SB09, E-1F9431, E-1F9432, E-1F9433, J-10SA

5.2.6 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available to provide indication of cold shutdown reactivity conditions. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B.

Cable 12SES02AA supplies power to SE054B from NN0211. Panel SE054B is associated with source range neutron indicator SENI0032B. Loss of power to the panel will prevent SENI0032B from operating. Cables 12SES02BB and 12SES02BC are instrument cables associated with source range channel 2 preamp SE0032. Damage to these cables will prevent operation of source range indicator SENI0032B. Source range monitoring remains available using SENI0031B, SENI0060A/B and SENI0061A/B.

References: XX-E-013, E-15000, E-13SE02, E-1F9101

5.2.7 Safety Injection and Containment Spray

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. A spurious containment spray actuation signal (CSAS) could cause the containment spray pumps to operate, depleting inventory in the RWST. These conditions are not desirable for PFSSD at Wolf Creek.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure transmitter co-incident

with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Containment spray (CS) is initiated automatically by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937.

Cables 12ABI21KA, 12ABI21NA, 12ABI21SA and 12ABI21VA associated with steam line pressure transmitters ABPT0515, ABPT0525, ABPT0535 and ABPT0545 run in fire area C-25. Cables for the remaining steam line pressure transmitters are unaffected by a fire in area C-25. Therefore, a spurious SI signal due to low steam line pressure will not occur in the event of a fire in area C-25.

A cable (12BBI16LB) associated with pressurizer pressure transmitter BBPT0456 is run in area C-25. Cables associated with the remaining pressurizer pressure transmitters are unaffected by a fire in area C-25. Therefore, a spurious SI signal due to low pressurizer pressure will not occur in the event of a fire in area C-25.

A cable (12GNI05BA) associated with containment pressure transmitter GNPT0936 is run in area C-25. Cables associated with the remaining containment pressure transmitters are unaffected by a fire in area C-25. Therefore, a spurious SI and CSAS due to high containment pressure will not occur in the event of a fire in area C-25.

Based on the above discussion, a spurious SIS and CSAS cannot occur if a fire occurs in this area.

References: E-15000, XX-E-013, E-13AB21, E-13BB16, E-13GN05, E-1F9431, E-1F9432, E-1F9433, M-12AB01, M-12BB02, M-12GN01

5.2.8 Pressurizer Pressure Control

The pressurizer pressure control system is included in the PFSSD analysis because spurious operation of the pressurizer pressure control system could have adverse consequences on PFSSD. A valid high-pressure signal will open the pressurizer PORVs and pressurizer spray valves, which is not desired for PFSSD.

An instrument cable (12BBI16LB) associated with pressurizer pressure transmitter BBPT0456 is run in fire area C-25. Damage to this cable could send a spurious high-pressure signal to the Ovation pressure control system. As discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure input channel will not cause the spurious operation of the pressurizer spray valves or PORVs due to the Ovation 4-channel validation logic, which uses the 2nd highest signal as the validated signal and has built-in logic to detect and ignore a failed input.

Based on the above discussion, pressurizer PORVs and pressure spray valves will not spuriously operate if a fire occurs in this area.

References: E-15000, XX-E-013, E-13BB16, E-1F9301, DCP 13324

FIRE AREA C-26

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-26 is located on the 2032 elevation of the Control Building and includes the room listed in Table C-26-1.

Table C-26-1
Rooms Located in Fire Area C-26

ROOM #	DESCRIPTION
C26	North Small Elec Chase 2032 Elevation

Fire area C-26 is protected with an automatic fire suppression and detection system. The area is bounded on all sides by minimum 3-hour fire resistance rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-26-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the potential fire impact on some of the more significant PFSSD equipment, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-26-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-26

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Steam generator ARV ABPV0003 may spuriously open or power to the ARV controller could be lost. The ARV can be closed using local controller ABFHC0003. Steamline pressure transmitters ABPT0526 and ABPT0536 may be affected. Redundant steamline pressure transmitters are unaffected.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
AE	Main Feedwater	H, P	Steam generator level indicators AELI0503, AELI0518, AELI0528, AELI0538 and AELI0548 may be affected. The remaining steam generator level indicators are unaffected.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
BB	Reactor Coolant System	R, M, H, P, S	Pressurizer pressure transmitter BBPT0457 may be affected. Pressurizer pressure indication is available using BBPI0455A, BBPI0456 or BBPI0458.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.

Table C-26-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-26

System	System Name	PFSSD Function*	Comments
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
GN	Containment Coolers	S	Containment pressure transmitter GNPT0935 may be affected. Redundant containment pressure transmitters are unaffected.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.

Table C-26-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-26

System	System Name	PFSSD Function*	Comments
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
NF	Load Shed and Emergency Load Sequencing	S	All PFSSD functions associated with load shed/emergency load sequencing system are satisfied. Separation group 3 power supply cables for load shedder/sequencer logic and input cabinets NF039A and NF039B could be affected. Redundant AC power is available from separation groups 1, 2 and 4 power supplies.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.

Table C-26-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-26

System	System Name	PFSSD Function*	Comments
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
RP	Miscellaneous Control Panels	R, M, H, P, S	Power to panel RP053DB could be affected. Power to panels RP053A, RP053B and RP147 is unaffected.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
SB	Reactor Protection System	R, S	RPS Channel 3 could be affected. RPS Channels 1, 2 and 4 are unaffected.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-26.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-26. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator Atmospheric Relief Valves

Steam Generator C ARV ABPV0003 may need to be closed using local controller ABFHC0003 in fire area A-23. Emergency lighting is available, and access is available without having to traverse area C-26.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

With one exception, redundant Post Fire Safe Shutdown capability exists if a severe fire occurs in fire area C-26. For the exception, a feasible manual action is available and is unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-26.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-26

There are no PFSSD components located in fire area C-26. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-26-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-26. The applicable evaluation section is also listed in Table C-26-3.

Table C-26-3
PFSSD Cables Located in Fire Area C-26

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
13ABI20GA	C26	ABPT0003	I	5.2.1	SG C ARV ABPV0003 Pressure Transmitter
13ABI20GC	C26	ABPV0003	I	5.2.1	SG C ARV Press Controller at RP118A
13ABI20GD	C26	ABPV0003	I	5.2.1	SG C ARV Press Controller at RP118A
13ABI20GE	C26	ABPY0003	I	5.2.1	SG C ARV ABPV0003 I/P Converter
13ABI21PA	C26	ABPT0526	I	5.2.2	SG B Steamline Pressure Transmitter
13ABI21TA	C26	ABPT0536	I	5.2.2	SG C Steamline Pressure Transmitter
13AEI08GB	C26	AELT0503	I	5.2.3	SG C Wide Range Level Transmitter
13AEI08HB	C26	AELT0518	I	5.2.3	SG A Narrow Range Level Transmitter
13AEI08JB	C26	AELT0528	I	5.2.3	SG B Narrow Range Level transmitter
13AEI08KB	C26	AELT0538	I	5.2.3	SG C Narrow Range Level Transmitter
13AEI08LB	C26	AELT0548	I	5.2.3	SG D Narrow Range Level Transmitter
13BBI16MB	C26	BBPT0457	I	5.2.2 5.2.7	Pressurizer Pressure Transmitter
13GNI05CA	C26	GNPT0935	I	5.2.2	Containment Pressure Transmitter
13NFK01CA	C26	NF039A	C	5.2.5	Load Shed / Sequencer Ch 1 Logic
13NFK01DA	C26	NF039B	C	5.2.5	Load Shed / Sequencer Ch 4 Logic
13NFY01EA	C26	NF039A	P	5.2.5	Load Shed / Sequencer Ch 1 Logic
13NFY01FA	C26	NF039B	P	5.2.5	Load Shed / Sequencer Ch 4 Logic
13NFY01GA	C26	NF039A	C	5.2.5	Load Shed / Sequencer Ch 1 Logic
13NFY01HA	C26	NF039B	C	5.2.5	Load Shed / Sequencer Ch 4 Logic
13RPY09AA	C26	RP053DB	P	5.2.1	120 VAC to BOP Instrumentation Rack from NN0307
13SBS01CD	C26	SB029A	P	5.2.6	120 VAC to SSPS A Input Panel from NN0309

Table C-26-3
PFSSD Cables Located in Fire Area C-26

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
13SBS02CD	C26	SB032A	P	5.2.6	120 VAC to SSPS B Input Panel from NN0310
13SBY09EA	C26	SB037	P	5.2.6	120 VAC to Process Protection Set 3 Panel from NN0311

5.2.1 Steam Generator Atmospheric Relief Valves

PFSSD requires at least two steam generator atmospheric relief valves (ARV) be controlled and the other two closed. The ARVs are pneumatically operated using air from the compressed air system (KA) or nitrogen from the nitrogen accumulators. The valves open by pneumatic pressure and close by spring action. A pressure transmitter installed on the outlet side of the steam generator sends a signal to a controller and automatically controls the associated ARV position. Alternatively, each ARV can be controlled manually from the control room or the auxiliary shutdown panel by placing the pressure indicating controller (PIC) in manual.

Cable 13RPY09AA supplies 120 VAC power to Train A BOP instrument rack RP053DB. The only PFSSD components controlled by RP053DB are ABPIC0003A, ABPIC0003B, ABHS0003, ABPT0003 and ABPY0003. These components are associated with steam generator C ARV ABPV0003. Loss of power to these components due to damage to cable 13RPY09AA will cause ABPV0003 to fail closed, which is the desired PFSSD position for a fire in this area.

Other cables associated with steam generator C ARV ABPV0003 are run in this area. Damage to these cables could prevent control or isolation of the ARV. If ARV ABPV0003 spuriously opens, it can be closed using local controller ABFHC0003 located in fire area A-23.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

Based on the above discussion, ARV ABPV0003 could fail in the open or closed position but no action is necessary to mitigate the failed ARV. If operators want to control or close the ARV, it can be controlled using local controller ABFHC0003 in fire area A-23.

References: E-15000, XX-E-013, E-13AB20A, E-13NN01, E-13RP09, E-1F9101, J-601B-00074, J-110-00588, M-12AB01, Calculation WCNOC-CP-002

5.2.2 Safety Injection and Containment Spray

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. A spurious containment spray actuation signal (CSAS) could cause the containment spray pumps to operate, depleting inventory in the RWST. These conditions are not desirable for PFSSD at Wolf Creek.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Containment spray (CS) is initiated automatically by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937.

Cables associated with containment pressure transmitter GNPT0935, pressurizer pressure transmitter BBPT0457 and steamline pressure transmitters ABPT0526 and ABPT0536 are run in fire area C-26. Cables for the remaining SIS/CSAS initiators are not run in fire area C-26. Consequently, a spurious CSAS and SIS is not credible if a fire occurs in area C-26 due to the absence of 2/3 or 2/4 CSAS and SIS initiator circuits.

References: E-15000, XX-E-013, E-13AB21, E-13BB16, E-13GN05, E-1F9431, E-1F9432, E-1F9433, M-12AB01, M-12BB02, M-12GN01

5.2.3 Steam Generator Level Indication

Steam generator level indication is required to ensure adequate auxiliary feedwater flow to the steam generators to support the decay heat removal function. Automatic signals (turbine trip, feedwater isolation, reactor trip, auxiliary feedwater actuation) based on steam generator level are not credited in the PFSSD analysis and maloperation of these signals is not adverse to PFSSD.

The available success path if a fire occurs in area C-26 credits MDAFP B to supply SGs A and D and the TDAFP to supply SGs A, B and/or D. Therefore, level indication on any two of SGs A, B and D is required.

A cable associated with SG A narrow range level transmitter AELT0518 is run in fire area C-26. Cables for the remaining level transmitters on SG A are unaffected by a fire in area C-26. Therefore, level indication on steam generator A is available.

A cable associated with SG B narrow range level transmitter AELT0528 is run in fire area C-26. Cables for the remaining level transmitters on SG B are unaffected by a fire in area C-26. Therefore, level indication on steam generator B is available.

Cables associated with SG C wide range level transmitter AELT0503 and narrow range level transmitter AELT0538 are run in fire area C-26. Cables for the remaining level transmitters on SG C are unaffected by a fire in area C-26. Therefore, level indication on steam generator C is available.

A cable associated with SG D narrow range level transmitter AELT0548 is run in fire area C-26. Cables for the remaining level transmitters on SG D are unaffected by a fire in area C-26. Therefore, level indication on steam generator D is available.

Based on the above discussion, level indication on all four steam generators is assured if a fire occurs in fire area C-26.

References: E-15000, XX-E-013, E-13AE08, E-1F9203, M-12AE02

5.2.4 Deleted

5.2.5 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

The outputs from each safeguards bus (NB01 and NB02) are divided into 4 separation groups; 1, 2, 3 and 4 and routed to two control panels, NF039A and NF039B. The input section of each control panel also receives group 1, 2, 3 and 4 instrument power (120VAC). The inputs then pass through isolation devices, at which point all inputs to NF039A become separation group 1 and all inputs to NF039B become separation group 4. Interruption of either the inputs or the instrument power from one separation group would impact the associated input channel but would not impact the other 3 input channels.

Cables 13NFK01CA and 13NFK01DA are associated with separation group 3 UV relays on buses NB01 and NB02, respectively. Cables 13NFY01GA and 13NFY01HA are associated with separation group 3 degraded voltage PTs on buses NB01 and NB02, respectively. Cables associated with the remaining three UV relays and PTs from separation groups 1, 2 and 4 do not run in fire area C-26.

Separation group 3 120 VAC instrument power supply cables 13NFY01EA and 13NFY01FA for load shedder/sequencer logic and input cabinets NF039A and NF039B, respectively, run in fire area C-26. Damage to these cables could cause a loss of separation group 3 120 VAC instrument power to the group 3 input panels, and therefore loss of input channel 3. Channels 1, 2 and 4 instrument AC power remains available from separation groups 1, 2 and 4 power supplies.

Automatic functioning of the bus NB01 and NB02 emergency load shedder / sequencer is unaffected by a fire in area C-26 because of the presence of circuits for only one of the four load shed/sequencer initiators. Therefore, a spurious start of the Train A and Train B diesel generators due to a false undervoltage condition on two of the four circuits is not credible.

Based on the above discussion, the Train A and Train B load shed/sequencers are available if a fire occurs in this area. Off-site power to both trains is unaffected based on Calculation XX-E-013, Appendix 2.

References: XX-E-013, E-15000, E-11005, E-11NB02, E-13NF01, E-092, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, J-104-00347

5.2.6 Reactor Protection System

The Reactor Protection System (RPS) monitors specified input parameters and initiates reactor protection features whenever those parameters are outside specified limits. Field installed transmitters continuously monitor various parameters and report the results to one of four process cabinets, one per channel. Signals are then sent from the process cabinets to both solid state protection cabinets, one on each train. The cabinets and associated channel are listed in the following table.

Process Cabinets	Solid State Protection Cabinets
Cabinet SB038 - Channel 1 Cabinet SB042 - Channel 2 Cabinet SB037 - Channel 3 Cabinet SB041 - Channel 4	Cabinet SB029A - Train A Input Cabinet Cabinet SB029B - Train A Logic Cabinet Cabinet SB029C - Train A Output Cabinet 1 Cabinet SB029D - Train A Output Cabinet 2 Cabinet SB032A - Train B Input Cabinet Cabinet SB032B - Train B Logic Cabinet Cabinet SB032C - Train B Output Cabinet 1 Cabinet SB032D - Train B Output Cabinet 2

The RPS is actuated upon 2/3 or 2/4 coincident logic, depending on the input parameter. This ensures that a loss of a single channel will not prevent the system from performing its function.

Cables 13SBS01CD, 13SBS02CD and 13SBY09EA associated with reactor protection system channel 3 run through this area. These cables supply power from separation group 3 power supplies to panels SB029A, SB032A and SB037, respectively. Damage to these cables could cause a loss of RPS channel 3, but channels 1, 2 and 4 remain unaffected. Therefore, the RPS is available if a fire occurs in this area.

References: XX-E-013, E-15000, E-13NN01, E-13SB01, E-13SB02, E-13SB03, E-13SB04, E-13SB05, E-13SB09, E-1F9431, E-1F9432, E-1F9433, J-10SA

5.2.7 Pressurizer Pressure Control

The pressurizer pressure control system is included in the PFSSD analysis because spurious operation of the pressurizer pressure control system could have adverse consequences on PFSSD. A validated high-pressure signal will open the pressurizer PORVs and pressurizer spray valves, which is not desired for PFSSD.

An instrument cable (13BBI16MB) associated with pressurizer pressure transmitter BBPT0457 is run in fire area C-26. Damage to this cable could send a spurious high-pressure signal to the Ovation pressure control system. As discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure input channel will not cause the spurious operation of the pressurizer spray valves or PORVs due to the Ovation 4-channel validation logic, which uses the 2nd highest signal as the validated signal and has built-in logic to detect and ignore a failed input.

Based on the above discussion, pressurizer PORVs and pressurizer spray valves will not spuriously open if a fire occurs in this area.

References: E-15000, XX-E-013, E-13BB16, E-1F9301, DCP 13324

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1.0 GENERAL AREA DESCRIPTION

Fire area C-27 is located on the 2047 elevation of the Control Building and includes the rooms listed in Table C-27-1.

Table C-27-1
Rooms Located in Fire Area C-27

ROOM #	DESCRIPTION
3601	Main Control Room
3603	Shift Managers Office
3604	Foyer
3605	Equipment Cabinet Area
3606	Emergency Equipment Storage Room
3616	Vestibule

Fire area C-27 is protected with an automatic Halon system in the cable trenches and automatic smoke detection in the control cabinets. The area is separated on all sides by minimum 3-hour fire resistance rated barriers.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

In the event of a fire in the control room, hot standby is achieved using certain Train B equipment per OFN RP-017, Control Room Evacuation. This equipment has been designed with the capability to isolate it from the control room to ensure a fire in this area does not prevent operation of the credited equipment.

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

In the event of a fire in the main control room that requires evacuation and shutdown from outside the control room, procedure OFN RP-017 will be utilized to achieve and maintain hot standby. If the severity of the fire requires the plant be brought to cold shutdown, procedure OFN RP-017A will be utilized.

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

The detailed analysis for a fire in the Main Control Room is contained in document E-1F9915.

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1.0 GENERAL AREA DESCRIPTION

Fire area C-28 is located on the 2047 elevation of the Control Building and includes the rooms listed in Table C-28-1.

Table C-28-1
Rooms Located in Fire Area C-28

ROOM #	DESCRIPTION
3602	Control Room Pantry
3607	Control Room Toilet
3608	Control Room Janitors Closet

Fire area C-28 is protected with automatic fire detection in rooms 3602 and 3608. There is no automatic suppression installed in this area.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-28-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the potential fire impact on some of the more significant PFSSD equipment, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-28-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-28

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.

Table C-28-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-28

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.

Table C-28-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-28

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
QD	Emergency Lighting	S	The 125 VDC emergency lights in the control room could be affected. Self-contained battery powered lighting units are available to provide lighting in the control room.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.

Table C-28-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-28

System	System Name	PFSSD Function*	Comments
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-28.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-28. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is unaffected by a fire in fire area C-28.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-28.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-28

There are no PFSSD components located in fire area C-28. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-28-4 lists all the PFSSD cables (S. in E-15000) located in fire area C-28. The applicable evaluation section is also listed in Table C-28-4.

Table C-28-4
PFSSD Cables Located in Fire Area C-28

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11QDK01AA	3602, 3607, 3608	QD01, QD02, QD03, QD04, QD05, QD06	P	5.2.1	Control Room Emergency Lights

5.2.1 Control Room Emergency Lights

Emergency lighting is provided in the control room to ensure adequate lighting during a station blackout or in the event a fire damages cables associated with the normal and standby lighting system. Emergency lights are supplied power from Class 1E 125 VDC breaker NK5120.

The control room has four sources of lighting; 1) Normal (QA); 2) Standby (QB); 3) Emergency (QD); and 4) Self-contained battery units (QD). The normal lighting system is not evaluated in the PFSSD analysis and is assumed lost.

The control building standby lighting system is powered by the Train A 480 VAC Class 1E electrical system through breakers NG01AHF1 and NG01AHF2. Power availability on NG01AHF1 and NG01AHF2 is monitored by auxiliary relays 27XQB1 and 27XQB2 in panel RP330. Upon loss of power to both NG01AHF1 and NG01AHF2, the relay coils are de-energized and the normally open contacts close. This energizes the contactor control relay which closes a contact and energizes the control room emergency DC lighting panel NK051A, which automatically illuminates the 125 VDC (QD System) emergency lights in the control room.

Cable 11QDK01AA provides power from emergency lighting panel NK051A to emergency lights QD01 through QD06. Damage to cable 11QDK01AA will disrupt power from NK051A to the QD lights, causing a loss of emergency DC lighting in the control room.

Self-contained Appendix R battery units are provided in the control room to provide minimum lighting for post-fire safe shutdown. Three units are provided in the front panel area, each with two light heads, to provide illumination on the main control boards. Two additional units are provided in the corridor area and two units are provided in the back panel area, each with two light heads. The Appendix R battery units are capable of providing minimum illumination for 8 hours, during which time action can be taken by maintenance to restore the normal or standby lighting system.

Based on the above discussion, sufficient lighting exists in the control room to achieve and maintain PFSSD.

References: E-15000, XX-E-013, E-093-00064, E-11NK01, E-13NG01A, E-13QB03, E-13QD01, E-1L3604, E-1L8900

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1.0 GENERAL AREA DESCRIPTION

Fire area C-29 is located on the 2047 elevation of the Control Building and includes the room listed in Table C-29-1.

Table C-29-1
Rooms Located in Fire Area C-29

ROOM #	DESCRIPTION
3609	SAS Room

Fire area C-29 is protected with automatic smoke detection. The area is separated on all sides by minimum 3-hour fire resistance rated barriers.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Fire area C-29 contains no post-fire safe shutdown cables or equipment. Therefore, both trains of PFSSD equipment are available if a fire occurs in this area.

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

Not applicable to fire area C-29.

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

A detailed analysis is not required since this area contains no PFSSD cables or components.

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1.0 GENERAL AREA DESCRIPTION

Fire area C-30 is located on the 2047 elevation of the Control Building and includes the rooms listed in Table C-30-1.

Table C-30-1
Rooms Located in Fire Area C-30

ROOM #	DESCRIPTION
3617	South Electrical Chase - 2047 Elevation

Fire area C-30 is protected by an automatic wet-pipe sprinkler system. In addition, automatic fire detection is installed throughout. The automatic suppression and detection system meets the requirements of 10CFR50, Appendix R, Section III.G.2.c.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-30-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-30-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-30

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Cables associated with S/G D ARV ABPV0004 may be damaged, preventing control of this valve from the control room. The ARV can be isolated by closing valves KAV1429 and KAV1365 to isolate air and nitrogen to the ARV. Steam line pressure transmitters ABPT0516 and ABPT0546 may be affected. The remaining steam line pressure transmitters are unaffected. The capability to isolate the MSIVs and bypass valves using hand switch ABHS0079 may be affected. The MSIVs and bypass valves can be isolated using hand switch ABHS0080. A number of main steam valves located downstream of the MSIVs could open. This will have no adverse impact on PFSSD since the MSIVs and bypass valves can be isolated. Main steam to TDAFP valves ABHV0005 and ABHV0006 could close, preventing operation of the TDAFP. See AL discussion for auxiliary feedwater availability.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-30.
AE	Main Feedwater	H, P	All PFSSD functions associated with the main feedwater system are satisfied. Steam generator (SG) level indication is available on SG B using wide range level transmitter AELT0502 and narrow range level transmitters AELT0528, AELT0529 and AELT0552. Steam generator level indication is available on SG C using wide range level transmitter AELT0503 and narrow range level transmitters AELT0538, AELT0539 and AELT0553. The capability to isolate the MFIVs using hand switch AEHS0081 may be affected. Isolate the MFIVs using hand switch AEHS0080.
AL	Aux. Feedwater System	H, P	Train B motor driven auxiliary feedwater pump (MDAFP) and the turbine driven auxiliary feedwater pump may be affected. Train A MDAFP is available to supply auxiliary feedwater to SGs B and C. Steam generator A flow transmitter ALFT0007 and steam generator D flow transmitter ALFT0001 may be affected. Steam generator B flow transmitter ALFT0009 and steam generator C flow transmitter ALFT0011 are unaffected.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-30.

Table C-30-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-30

System	System Name	PFSSD Function*	Comments
BB	Reactor Coolant System	R, M, H, P, S	All PFSSD functions associated with the reactor coolant system are satisfied. All four seal water injection valves will remain open. When transferring to RHR, valve BBPV8702A may need to be manually opened or a cold shutdown repair performed to provide a suction source from the RCS to RHR pump A. Pressurizer PORV BBPCV0456A may open and block valve BBHV8000B may not close. If this occurs, Operators can close the PORV by placing BBHIS0456A in the CLOSE position. Pressure indicator BBPI0406 may not function. Pressure indicator BBPI0405 is unaffected. Reactor vessel head vent valve BBHV8002B could spuriously open. The remaining head vent valves are unaffected and will remain closed to isolate the head vent flow path. RCS temperature recorders BBTR0433 and BBTR0443 on loops 3 and 4 could lose power. Temperature indication on loops 1 and 2 remains available. Pressurizer pressure transmitter BBPT0458 could be affected. The remaining pressurizer pressure transmitters are unaffected. Pressurizer pressure indication is available using BBPI0455A, BBPI0456 and BBPI0457.
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. Train A Centrifugal Charging Pump (CCP) is available to provide charging flow from the RWST to the RCP seals and the BIT injection flowpath. Train B CCP miniflow valve BGHV8111 may be affected. Train A CCP miniflow valve BGHV8110 is unaffected. Valve BGHV8105 may be affected. Redundant valve BGHV8106 is unaffected and can be closed using hand switch BGHIS8106 to isolate flow to the regenerative heat exchanger. VCT isolation valve BGLCV0112C may be affected but redundant valve BGLCV0112B can be isolated using BGHIS0112B. CCP B to RCP seal injection valve BGHV8357B could be affected. Redundant Train A CCP to RCP seal injection valve BGHV8357A is unaffected. VCT level transmitter BGLT0185 may be affected. VCT level transmitter BGLT0112 is unaffected. Excess letdown valve BGHV8154B could spuriously open. Redundant valve BGHV8153B is unaffected. RCP seal flow indication is available using BGFI0215A. RCP seal flow indicator BGFI0215B may be affected.
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blowdown system are satisfied. Steam generator blowdown is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C, located on the BM157 panel in the radwaste control room.

Table C-30-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-30

System	System Name	PFSSD Function*	Comments
BN	Borated Refueling Water Storage System	R, M, H	The RWST is available to provide a suction source to Centrifugal Charging Pump A via valve BNLCV0112D. RWST level indication is available using BNLI0930, BNLI0931 and BNLI0932.
EF	Essential Service Water System	H, S	All PFSSD functions associated with the Essential Service Water (ESW) system are satisfied. A number of components associated with Train B ESW may be affected. Train A ESW is available.
EG	Component Cooling Water System	S	All PFSSD functions associated with the Component Cooling Water (CCW) system are satisfied. Train B CCW may be affected. Train A CCW is available. CCW flow to the RCP thermal barrier could be temporarily disrupted due to closure of valves EGHV0062 and EGHV0071. Valves EGHV0132 and EGHV0126 can be opened from the control room to restore CCW flow to the thermal barriers. RCP seal injection is unaffected. CCW to RCP flow indicator EGFI0129 could be affected. CCW to RCP flow indicator EGFI0128 is unaffected. Valve EGHV0102 could be affected, preventing operation of Train B RHR. Valve EGHV0101 is unaffected.
EJ	Residual Heat Removal System	M, H, P	All PFSSD functions associated with Residual Heat Removal (RHR) system are satisfied. The Train B RHR pump may be affected but the Train A RHR pump is available. Loss of RCS inventory through the RHR flow path is prevented by maintaining valves EJHV8701A and EJHV8701B closed. Valve EJHV8701A can be opened from the control room when transitioning to RHR for cold shutdown. RHR pump B mini-flow valve EJFCV0611 is affected but RHR pump A mini-flow valve EJFCV0610 is available. RHR Train B to SI Pump B isolation valve EJHV8804B could spuriously open. RHR Train A to CVCS valve EJHV8804A is unaffected. Train B RHR pump discharge to RCS cold leg isolation valve EJHV8809B is affected. Train A RHR pump discharge to RCS cold leg isolation valve EJHV8809A is unaffected. Valve EJHV8840 could spuriously open in the event of a fire in this area. This will not affect hot standby, however the valve will need to be locally closed prior to entering shutdown cooling mode. RHR Train B flow control valve EJHCV0607 could be affected. RHR Train A flow control valve EJHCV0606 is unaffected.

Table C-30-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-30

System	System Name	PFSSD Function*	Comments
EM	High Pressure Coolant Injection	R, M	Train B safety injection pump PEM01B could spuriously start. Injection will not occur with the reactor at normal pressure. The pump can be stopped by opening breaker NB0202, but this action is not required for PFSSD. Charging flow from CCP A to the RCS is available through the BIT by opening valves EMHV8803A and EMHV8801A. Prevent flow diversion through the SIS test line when charging through the BIT by maintaining valve EMHV8964 closed.
EN	Containment Spray	R, M	Containment spray pump PEN01B could spuriously start and valve ENHV0012 could open, causing containment spray. Pump PEN01B can be stopped by opening breaker NB0203 in area C-10. Containment spray pump PEN01A is unaffected.
EP	Safety Injection Accumulators	H	The PFSSD Decay Heat Removal function associated with the Safety Injection Accumulators is satisfied. Accumulator injection lines can be isolated by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. It may be necessary to make a containment entry to manually close EPHV8808B and EPHV8808D prior to the RCS reaching 1000 psig.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-30.
FC	Auxiliary Turbines	R, H, P	Turbine driven auxiliary feedwater pump steam trap valve FCFV0310 may not close. Uncontrolled blowdown through this 1-inch line will not cause unacceptable RCS cooldown and will not impact PFSSD. Turbine driven steam generator feedwater pump B main steamline low point drain valve FCHV0103 may not close. This will have no adverse impact on PFSSD since the MSIVs and MSIV bypass valves can be isolated using ABHS0080.
GD	ESW Pump House HVAC	S	The PFSSD function associated with ESW pump house HVAC is satisfied. The Train B ESW pump room ventilation system could be affected. The Train A ESW pump room ventilation system is unaffected.
GF	AFW Pump Room Coolers	S	The PFSSD function associated with the Auxiliary Feedwater Pump Room Coolers is satisfied. Train B motor driven auxiliary feedwater pump room cooler SGF02B may be affected. Train A motor driven auxiliary feedwater pump room cooler SGF02A is unaffected.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function associated with the Control Room and Class 1E Switchgear Room Coolers is satisfied. Train B control room A/C unit SGK04B may be affected. Train A control room A/C unit SGK04A is unaffected. Train B Class 1E electrical equipment room A/C unit SGK05B may be affected. Train A Class 1E electrical equipment room A/C unit SGK05A is unaffected.

Table C-30-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-30

System	System Name	PFSSD Function*	Comments
GL	Auxiliary Building HVAC	S	The PFSSD function associated with the Auxiliary Building HVAC system is satisfied. Train B CCW pump room cooler SGL11B may be affected. Train A CCW pump room cooler SGL11A is unaffected.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function associated with the emergency diesel generator room HVAC system is satisfied. The Train B emergency diesel generator exhaust damper GMHZ0019 could be affected. The Train A diesel generator room HVAC system is unaffected.
GN	Containment Coolers	S	The PFSSD function associated with the containment coolers is satisfied. Train B containment coolers SGN01B and SGN01D could be affected. Train A containment coolers SGN01A and SGN01C are available. Containment pressure transmitter GNPT0934 could be affected. The remaining three pressure transmitters are unaffected.
JE	Diesel Fuel Oil	S	The PFSSD function associated with the Diesel Fuel Oil System is satisfied. The Train B emergency fuel oil transfer pump PJE01B may be affected. The Train A emergency fuel oil transfer pump PJE01A is unaffected. The Train B emergency diesel generator day tank level transmitter JELT0021 may be affected. The Train A day tank level transmitter is unaffected.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-30.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-30.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-30.
KJ	Standby Diesel Engine	S	The PFSSD function associated with the Standby Diesel System is satisfied. The Train B diesel engine may be affected. The Train A diesel engine is unaffected.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-30.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-30.
NB	4.16 kV System	S	The PFSSD function associated with the class 1E 4.16 kV system is satisfied. A loss of off-site and on-site power to NB02 may occur. On-site and off-site power to NB01 is unaffected.
NE	Standby Diesel Generator	S	The PFSSD function associated with the standby diesel generator system is satisfied. The Train B standby diesel generator could be affected. The Train A standby diesel generator is unaffected.

Table C-30-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-30

System	System Name	PFSSD Function*	Comments
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function associated with the load shed/emergency load sequencing system is satisfied. Cables associated with one of the four undervoltage (UV) relays and degraded voltage potential transformers on Trains A and B are run in fire area C-30. Emergency load shed/sequencer operates when 2/4 UV relays sense undervoltage on the bus. Therefore, automatic operation of the load shed/sequencer is unaffected.
NG	480V Load Centers and MCCs	S	The PFSSD function associated with the class 1E 480 volt load centers is satisfied. A loss of off-site and on-site power to Train B 480 VAC Class 1E load centers and MCCs could occur. Off-site and on-site power to Train A 480 VAC Class 1E load centers and MCCs is available.
NK	125VDC	S	Train B class 1E 125 VDC power could be disrupted to control room panels RL001/RL002, RL005/RL006, RL017/RL018, RL019/RL020, RL021/RL022 and RL023/RL024. Train A class 1E 125 VDC power is unaffected. The normal source of power to NK02 and NK04, through the Train B 480 V distribution system, could be disrupted. 125 VDC battery sets NK012 and NK014 are unaffected. Train B class 1E 125 VDC power could be disrupted to RPS output panel SB032D. 125 VDC power is available to Train A RPS output panel SB029D.
NN	120VAC	S	The backup source of power to Train B Class 1E electrical distribution switchboards NN02 and NN04 could be affected. The normal source of power to NN02 and NN04 is unaffected due to the availability of 125 VDC battery sets NK012 and NK014. Train A Class 1E electrical distribution switchboards NN01 and NN03 are unaffected.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-30.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-30.
PG	480V Load Centers and MCCs	S	Power from PG20GBR217 to RL023 could be affected. Power from PG19GCR217 to RL023 is unaffected. Load Center PG20 could lose power due to loss of PG2001. Redundant capability is available.
PK	125VDC	S	The PFSSD function associated with the non-class 1E 125 VDC system is satisfied. Battery charger PK22 may be affected. Battery set PK12 will maintain 125 VDC power to PK02. Also, Train A non-class 1E 125 VDC system is unaffected.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-30.
PN	120VAC	S	Power from PN0833 to RL017/RL018 may be affected. Power from PN0835 to RL021/RL022 may be affected. Power from PN0736 and PN0738 to RL017/RL018 and RL021/RL022 is unaffected.

Table C-30-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-30

System	System Name	PFSSD Function*	Comments
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-30.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-30.
RL	Control Room MCB	S	The PFSSD function associated with the control room panels is satisfied. Train B Class 1E 125 VDC power to RL001/RL002, RL005/RL006, RL017/RL018, RL019/RL020, RL021/RL022 and RL023/RL024 could be disrupted. The components either fail in the desired PFSSD position or the redundant Train A component is available. Train A Class 1E 125 VDC power is unaffected. Non class 1E (separation group 6) 120 VAC power to panels RL017/RL018, RL021/RL022 and RL023/RL024 could be affected. Non class 1E (separation group 5) 120 VAC power to panels RL017/RL018, RL021/RL022 and RL023/RL024 is unaffected.
RP	Miscellaneous Control Panels	R, M, H, P, S	Power to BOP instrument rack RP053B could be disrupted. BOP instrument racks RP053A, RP053D and RP147 are unaffected. Train B 120 VAC control power to panel RP068 could be affected. Train A 120 VAC control power to panel RP068 is unaffected. Control room lockout relays 86XRP5, 86XRP6 and 86XRP7 could be affected, preventing operation of Train B and turbine driven auxiliary feedwater. Train A auxiliary feedwater remains available. Power to Group 2 Process Control Rack RP047 could be affected. This will not affect PFSSD as discussed in Section 5.2.12.
SA	ESFAS	S	125 VDC and 120 VAC power to panel SA036B could be lost, resulting in a loss of Channel 4 Engineered Safety Features Actuation System (ESFAS). Redundant Channels 1 and 2 are unaffected. Status panel input for GKHZ0040A/B, SGK04B and SGK05B could be affected. This will not adversely impact PFSSD.

Table C-30-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-30

System	System Name	PFSSD Function*	Comments
SB	Reactor Protection System	R, S	All PFSSD functions associated with the reactor protection system are satisfied. A loss of power to input channel 4 in SB029A and SB032A could occur. Input channels 1, 2 and 3 remain available. Train B output cabinet SB032D could lose power. Train A output cabinets are unaffected. Train B reactor trip switchgear SB102B could be affected. Train A reactor trip switchgear SB102A is unaffected. Channel 4 process protection panel SB041 could lose power. Process protection channels 1, 2 and 3 remain available. A number of process monitoring instruments at the ASP could be affected. Redundant process monitoring instruments in the main control room are unaffected.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-30.
SE	Ex-Core Neutron Monitoring	R, P	All PFSSD functions associated with the ex-core neutron monitoring system are satisfied. SR monitor signal processor SENY0061B, SR monitor amplifier SENY0061A and source range recorder for SENY0061B could be affected. Source Range monitoring remains available using SENE0031, SENE0032 and SENY0060A/B
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-30.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-30.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-30. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator Atmospheric Relief Valves

Cables associated with S/G ARV ABPV0004 may be damaged, preventing control of this valve from the control room. The ARV can be isolated by closing valve KAV1429 and nitrogen is isolated by closing valve KAV1365. The air and nitrogen supply valves are located in fire area A-23 and access is available without having to traverse area C-30.

3.1.2 Steam Generator Blowdown Isolation

Blowdown may not be isolable using BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A. Therefore, it may be necessary to isolate blowdown using BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C located on BM157 in the Radwaste Control room.

3.1.3 **Containment Spray Pump** (OMA, refer to E-1F9900)

Containment spray pump PEN01B could spuriously start and valve ENHV0012 could open, causing containment spray. The pump can be stopped by opening breaker NB0203 in area C-10. Access is available without traversing area C-30 and emergency lighting is provided.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Main Steam Isolation Valves and MSIV Bypass Valves

The capability to isolate the MSIVs and bypass valves using hand switch ABHS0079 may be affected. The MSIVs and bypass valves can be isolated using hand switch ABHS0080.

3.2.2 Main Feedwater Isolation Valves

The capability to isolate the MFIVs using hand switch AEHS0081 may be affected. Isolate the MFIVs using hand switch AEHS0080.

3.2.3 Volume Control Tank

Valve BGLCV0112C may not close in response to a signal from the control room. Redundant valve BGLCV0112B can be isolated using BGHIS0112B on RL001.

3.2.4 Thermal Barrier Cooling

CCW flow to the thermal barrier cooling coils could be lost due to the spurious closure of valves EGHV0062 and EGHV0071. If this occurs, operators could open bypass valves EGHV0132 (EGHV0062 bypass) and EGHV0126 (EGHV0071 bypass) using EGHIS0132 and

EGHIS0126, respectively. Otherwise, operators should close EGHV0061 using EGHIS0061 to prevent a steam bubble from damaging the CCW piping. CCW to RCP flow indicator EGFI0128 is available to diagnose a loss of CCW flow to the RCP thermal barriers.

3.2.5 Charging

If necessary, to establish an alternate makeup and boration flowpath, the Train A CCP is available to charge through the BIT and valves EMHV8801A and EMHV8803A can be opened using EMHIS8801A and EMHIS8803A.

3.2.6 Component Cooling Water

Train B CCW could be affected by a fire in this area. If this occurs, swap to Train A CCW using normal operating procedures if Train A CCW is not already running.

3.2.7 Pressurizer PORV/Block Valve

Pressurizer PORV BBPCV0456A could spuriously open and block valve BBHV8000B may not close. If this occurs, Operators can close the PORV by placing BBHIS0456A in the CLOSE position. Pressurizer pressure indication is available using BBPI0455A, BBPI0456 and BBPI0457 located on RL002.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR

A number of Train B RHR components, including the Train B RHR pump, may be affected by a fire in this area. Use Train A RHR for shutdown cooling. Valve BBPV8702A may need to be manually opened, or a cold shutdown repair performed, when aligning Train A RHR.

Valve EJHV8840 could spuriously open in the event of a fire in this area. This will not affect hot standby, however the valve will need to be locally closed prior to entering shutdown cooling mode.

3.3.2 Safety Injection Accumulators

It may be necessary to make a containment entry to close SI Accumulator injection valves EPHV8808B and EPHV8808D if these valves are unresponsive from the control room. Otherwise, nitrogen pressure can be relieved from the tanks to prevent injection. Valves EPHV8808A and EPHV8808C are unaffected.

4.0 CONCLUSION

With some exceptions, redundant Post Fire Safe Shutdown capability exists if a severe fire occurs in area C-30. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-30.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-30

There are no PFSSD components located in area C-30. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-30-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-30. The applicable evaluation section is also listed in Table C-30-3.

Table C-30-3
PFSSD Cables Located in Fire Area C-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ABI20HE	3617	ABPY0004	I	5.2.1	SG D Atmospheric Relief Valve I/P Converter
14ABI20HG	3617	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HH	3617	ABPV0004	I	5.2.1	SG D Steamline Pressure (ABPT0004)
14ABI20HJ	3617	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HK	3617	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HL	3617	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HM	3617	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HN	3617	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI21LA	3617	ABPT0516	I	5.2.2	Steam Generator A Pressure Transmitter
14ABI21WA	3617	ABPT0546	I	5.2.2	Steam Generator D Pressure Transmitter
14ABK08DA	3617	ABUV0034	C	5.2.3	Steam Dump/Cooldown to the L.P. Condenser
14ABK08EA	3617	ABUV0045	C	5.2.3	Steam Dump Valve to the H.P. Condenser
14ABK08FA	3617	ABUV0041	C	5.2.3	Steam Dump Valve to the I.P. Condenser
14ABK11AA	3617	ABUV0037	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11BA	3617	ABUV0038	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11CA	3617	ABUV0039	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11DA	3617	ABUV0040	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11EA	3617	ABUV0036	C	5.2.3	Steam Dump/Cooldown to the L.P. Condenser
14ABK11FA	3617	ABUV0042	C	5.2.3	Steam Dump Valve to the I.P. Condenser
14ABK11GA	3617	ABUV0043	C	5.2.3	Steam Dump Valve to the I.P. Condenser
14ABK11HA	3617	ABUV0044	C	5.2.3	Steam Dump Valve to the I.P. Condenser
14ABK11JA	3617	ABUV0035	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK23FA	3617	ABHY0012B	C	5.2.4	ABHV0012 Solenoid Valve

Table C-30-3
PFSSD Cables Located in Fire Area C-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ABK23FB	3617	ABHY0015B	C	5.2.4	ABHV0015 Solenoid Valve
14ABK23FC	3617	ABHY0018B	C	5.2.4	ABHV0018 Solenoid Valve
14ABK23FD	3617	ABHY0021B	C	5.2.4	ABHV0021 Solenoid Valve
14ABK23FE	3617	ABHV0012, ABHV0015, ABHV0018, ABHV0021	C	5.2.4	MSIV Bypass Valves
14ABK23FF	3617	ABHS0079	C	5.2.4	MSIV & MSIV Bypass Valves Handswitch
14ABK23FG	3617	ABHV0012, ABHV0015 ABHV0018, ABHV0021	C	5.2.4	Main Steam Isolation Valve ABHV0011, 14, 17, 20 Bypass Valve
14ABK28AH	3617	ABHV0017	C	5.2.5	Main Steam Isolation Valve
14ABK28BH	3617	ABHV0011	C	5.2.5	Main Steam Isolation Valve
14ABK29AH	3617	ABHV0014	C	5.2.5	Main Steam Isolation Valve
14ABK29BH	3617	ABHV0020	C	5.2.5	Main Steam Isolation Valve
14ABK30BB	3617	SA075B	P	5.2.5 5.2.7	125 VDC to MSFIS Cabinet SA075B from NK5423
14AEI08NB	3617	AELT0517	I	5.2.6	SG A Narrow Range Level Transmitter
14AEI08PB	3617	AELT0527	I	5.2.6	SG B Narrow Range Level Transmitter
14AEI08QB	3617	AELT0537	I	5.2.6	SG C Narrow Range Level Transmitter
14AEI08RB	3617	AELT0547	I	5.2.6	SG D Narrow Range Level Transmitter
14AEK16AH	3617	AEFV0040	C	5.2.7	SG B Main Feedwater Isolation Valve
14AEK16BH	3617	AEFV0042	C	5.2.7	SG D Main Feedwater Isolation Valve
14AEK17AH	3617	AEFV0039	C	5.2.7	SG A Main Feedwater Isolation Valve
14AEK17BH	3617	AEFV0041	C	5.2.7	SG C Main Feedwater Isolation Valve
14ALB01B1	3617	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor

Table C-30-3
PFSSD Cables Located in Fire Area C-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALB01B2	3617	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALB01BD	3617	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALB01BG	3617	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALB01BM	3617	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALB01BP	3617	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALB01BR	3617	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALG02AF	3617	ALHV0034	C	5.2.8	Cond Storage Tank To MDAFW Pump B
14ALG02AG	3617	ALHV0034	C	5.2.8	Cond Storage Tank To MDAFW Pump B
14ALG02AH	3617	ALHV0034	C	5.2.8	Cond Storage Tank To MDAFW Pump B
14ALG02AK	3617	ALHV0034	C	5.2.8	Cond Storage Tank To MDAFW Pump B
14ALG04AF	3617	ALHV0030	C	5.2.8	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04AG	3617	ALHV0030	C	5.2.8	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04AH	3617	ALHV0030	C	5.2.8	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04AK	3617	ALHV0030	C	5.2.8	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04DF	3617	ALHV0033	C	5.2.8	Train B ESW to TDAFP
14ALG04DG	3617	ALHV0033	C	5.2.8	Train B ESW to TDAFP
14ALG04DH	3617	ALHV0033	C	5.2.8	Train B ESW to TDAFP
14ALG04DK	3617	ALHV0033	C	5.2.8	Train B ESW to TDAFP
14ALI03AG	3617	ALHV0005	I	5.2.8	MDAFP B to SG D
14ALI03AH	3617	ALHV0005	I	5.2.8	MDAFP B to SG D
14ALI03AJ	3617	ALHV0005	I	5.2.8	MDAFP B to SG D
14ALI03AK	3617	ALHV0005	I	5.2.8	MDAFP B to SG D
14ALI03AL	3617	ALHV0005	I	5.2.8	MDAFP B to SG D

Table C-30-3
PFSSD Cables Located in Fire Area C-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALI03AM	3617	ALHV0005	I	5.2.8	MDAFP B to SG D
14ALI03AP	3617	ALHV0005	I	5.2.8	MDAFP B to SG D
14ALI03BC	3617	ALHV0007	I	5.2.8	MDAFP B to SG A
14ALI03BD	3617	ALHV0007	I	5.2.8	MDAFP B to SG A
14ALI03BE	3617	ALHV0007	I	5.2.8	MDAFP B to SG A
14ALI03BF	3617	ALHV0007	I	5.2.8	MDAFP B to SG A
14ALI05AG	3617	ALHV0010	I	5.2.8	TDAFP to SG B
14ALI05AH	3617	ALHV0010	I	5.2.8	TDAFP to SG B
14ALI05AJ	3617	ALHV0010	I	5.2.8	TDAFP to SG B
14ALI05AK	3617	ALHV0010	I	5.2.8	TDAFP to SG B
14ALI05AM	3617	ALHV0010	I	5.2.8	TDAFP to SG B
14ALI05AN	3617	ALHV0010	I	5.2.8	TDAFP to SG B
14ALI05AQ	3617	ALHV0010	I	5.2.8	TDAFP to SG B
14ALI05BC	3617	ALHV0012	I	5.2.8	TDAFP to SG C
14ALI05BD	3617	ALHV0012	I	5.2.8	TDAFP to SG C (ALHY0012)
14ALI05BE	3617	ALHV0012	I	5.2.8	TDAFP to SG C
14ALI05BF	3617	ALHV0012	I	5.2.8	TDAFP to SG C
14ALI07AD	3617	ALFT0001	I	5.2.8	Aux Feedwater to SG D Flow
14ALI07AE	3617	ALFT0001	I	5.2.8	Aux Feedwater to SG D Flow
14ALI07HD	3617	ALPT0024	I	5.2.8	MDAFP B Suction Pressure
14ALI07HE	3617	ALPT0024	I	5.2.8	MDAFP B Suction Pressure
14ALI07HF	3617	ALPT0024	I	5.2.8	MDAFP B Suction Pressure
14ALI08CA	3617	ALPT0039	I	5.2.8	ESFAS AFW Low Suction Press Transmitter

Table C-30-3
PFSSD Cables Located in Fire Area C-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALI09AA	3617	ALFT0007	I	5.2.8	Aux Feedwater to SG A Flow
14ALK01BA	3617	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALY09AD	3617	ALHV0005	C	5.2.8	MDAFP B to SG D
14ALY09BD	3617	ALHV0007	C	5.2.8	MDAFP B to SG A
14BBG04AA	3617	BBHV8351A	P	5.2.9	RCP A Seal Water Supply
14BBG04AB	3617	BBHV8351A	C	5.2.9	RCP A Seal Water Supply
14BBG04AC	3617	BBHV8351A	C	5.2.9	RCP A Seal Water Supply
14BBG04BA	3617	BBHV8351B	P	5.2.9	RCP B Seal Water Supply
14BBG04BB	3617	BBHV8351B	C	5.2.9	RCP B Seal Water Supply
14BBG04BC	3617	BBHV8351B	C	5.2.9	RCP B Seal Water Supply
14BBG04CA	3617	BBHV8351C	P	5.2.9	RCP C Seal Water Supply
14BBG04CB	3617	BBHV8351C	C	5.2.9	RCP C Seal Water Supply
14BBG04CC	3617	BBHV8351C	C	5.2.9	RCP C Seal Water Supply
14BBG04DA	3617	BBHV8351D	P	5.2.9	RCP D Seal Water Supply
14BBG04DB	3617	BBHV8351D	C	5.2.9	RCP D Seal Water Supply
14BBG04DC	3617	BBHV8351D	C	5.2.9	RCP D Seal Water Supply
14BBG12AF	3617	BBPV8702A	C	5.2.11	RCS Hot Leg 1 to RHR Pump A Suction
14BBG12AG	3617	BBPV8702A	C	5.2.11	RCS Hot Leg 1 to RHR Pump A Suction
14BBG12BF	3617	BBPV8702B	C	5.2.11	RCS Hot Leg 4 to RHR Pump B Suction
14BBG12BG	3617	BBPV8702B	C	5.2.11	RCS Hot Leg 4 to RHR Pump B Suction
14BBG39BC	3617	BBHV8000B	C	5.2.12	Pressurizer PORV BBPCV0456A Block Valve
14BBI16BB	3617	BBPT0406	I	5.2.13	RCS Hot Leg Wide Range Pressure

Table C-30-3
PFSSD Cables Located in Fire Area C-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BBI16NB	3617	BBPT0458	I	5.2.2 5.2.12 5.2.43	Pressurizer Pressure Transmitter
14BBK30DA	3617	BBHV8002B	C	5.2.14	RX Vessel Head Vent Valve
14BBK40BK	3617	BBPCV0456A	C	5.2.12	Pressurizer Power Operated Relief Valve
14BBK40BM	3617	BBPCV0456A	C	5.2.12	Pressurizer Power Operated Relief Valve
14BBK40BN	3617	BBPCV0456A	P	5.2.12	Pressurizer Power Operated Relief Valve
14BGB01BB	3617	DPBG05B	C	5.2.15	Train B Centrifugal Charging Pump Motor
14BGG11AC	3617	BGHV8105	C	5.2.16	Charging Pumps to Regenerative HX
14BGG11DC	3617	BGHV8111	C	5.2.15	CCP B Miniflow Valve
14BGG11DD	3617	BGHV8111	C	5.2.15	CCP B Miniflow Valve
14BGG12BA	3617	BGLCV0112C	P	5.2.17	VCT Outlet Valve
14BGG12BB	3617	BGLCV0112C	C	5.2.17	VCT Outlet Valve
14BGG12BC	3617	BGLCV0112C	C	5.2.17	VCT Outlet Valve
14BGG12BE	3617	BGLCV0112C	C	5.2.17	BNLCV112E Interlock
14BGG52BC	3617	BGHV8357B	C	5.2.9	CCP B Discharge to RCP Seals
14BGI51BA	3617	BGFT0215B	I	5.2.9	RCP Seal Total Flow Transmitter
14BGI51DA	3617	BGLT0185	I	5.2.17	VCT Level Transmitter
14BGK48BB	3617	BGHV8154B	C	5.2.18	Excess Letdown Isolation Valve
14BMK06AA	3617	BMHV0001	C	5.2.19	SG A Blowdown to Flash Tank
14BMK06AC	3617	BMHV0001	C	5.2.19	SG A Blowdown to Flash Tank
14BMK06BA	3617	BMHV0002	C	5.2.19	SG B Blowdown to Flash Tank
14BMK06BC	3617	BMHV0002	C	5.2.19	SG B Blowdown to Flash Tank

Table C-30-3
PFSSD Cables Located in Fire Area C-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BMK06CA	3617	BMHV0003	C	5.2.19	SG C Blowdown to Flash Tank
14BMK06CC	3617	BMHV0003	C	5.2.19	SG C Blowdown to Flash Tank
14BMK06DA	3617	BMHV0004	C	5.2.19	SG D Blowdown to Flash Tank
14BMK06DC	3617	BMHV0004	C	5.2.19	SG D Blowdown to Flash Tank
14BNG01BC	3617	BNLCV0112E	C	5.2.15	Charging Pump B Suction from RWST
14BNG01BD	3617	BNLCV0112E	C	5.2.15	Charging Pump B Suction from RWST
14BNG03BC	3617	BNHV8812B	C	5.2.20	RWST To RHR Pump B Suction
14BNI07FA	3617	BNLT0933	I	5.2.20	Refueling Water Storage Tank Level
14EFB01SA	3617	DPEF01B	C	5.2.21	Train B ESW Pump Motor
14EFB01SB	3617	DPEF01B	C	5.2.21	Train B ESW Pump Motor
14EFG02CC	3617	EFHV0025	C	5.2.21	Service Water to Train A ESW Cross Connect
14EFG02CD	3617	EFHV0025	C	5.2.21	Service Water to Train A ESW Cross Connect
14EFG02CE	3617	EFHV0025	C	5.2.21	Service Water to Train A ESW Cross Connect
14EFG02CF	3617	EFHV0025	C	5.2.21	Service Water to Train A ESW Cross Connect
14EFG02DC	3617	EFHV0026	C	5.2.21	Service Water to Train B ESW Cross Connect
14EFG02DD	3617	EFHV0026	C	5.2.21	Service Water to Train B ESW Cross Connect
14EFG02DE	3617	EFHV0026	C	5.2.21	Service Water to Train B ESW Cross Connect
14EFG02DF	3617	EFHV0026	C	5.2.21	Service Water to Train B ESW Cross Connect
14EFG03AC	3617	EFHV0039	C	5.2.21	ESW A to Service Water Cross Connect Valve
14EFG03AD	3617	EFHV0039	C	5.2.21	ESW A to Service Water Cross Connect Valve
14EFG03AE	3617	EFHV0039	C	5.2.21	ESW A to Service Water Cross Connect Valve
14EFG03BC	3617	EFHV0040	C	5.2.21	ESW B to Service Water Cross Connect Valve
14EFG03BD	3617	EFHV0040	C	5.2.21	ESW B to Service Water Cross Connect Valve

Table C-30-3
PFSSD Cables Located in Fire Area C-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EFG03BE	3617	EFHV0040	C	5.2.21	ESW B to Service Water Cross Connect Valve
14EFG04BC	3617	EFHV0060	C	5.2.21	Train B ESW from CCW B HX
14EFG05BC	3617	EFHV0052	C	5.2.21	Train B ESW to CCW B HX
14EFG06BC	3617	EFHV0038	C	5.2.21	ESW B To Ultimate Heat Sink
14EFG07BC	3617	EFHV0032	C	5.2.21	Train B ESW to Containment Air Coolers
14EFG08BC	3617	EFHV0050	C	5.2.21	Train B ESW from Containment Air Coolers
14EFG09BC	3617	EFHV0034	C	5.2.21	Train B ESW to Containment Air Coolers
14EFG09DC	3617	EFHV0046	C	5.2.21	Train B ESW from Containment Air Coolers
14EFI08RB	3617	EFPT0002	I	5.2.21	Train B ESW Pump Discharge Pressure
14EFI11FA	3617	EFFT0054	I	5.2.21	Train B ESW Flow Transmitter
14EGB01BB	3617	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BC	3617	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BD	3617	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BG	3617	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BK	3617	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01DB	3617	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGB01DC	3617	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGB01DD	3617	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGB01DG	3617	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGG05BC	3617	EGHV0016	C	5.2.10	CCW B Common Header Return
14EGG05DC	3617	EGHV0054	C	5.2.10	CCW B to Common Header
14EGG05DD	3617	EGHV0054	C	5.2.10	CCW B to Common Header
14EGG07BA	3617	EGHV0102	P	5.2.11	CCW to RHR HX B Isolation

Table C-30-3
PFSSD Cables Located in Fire Area C-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EGG07BB	3617	EGHV0102	C	5.2.11	CCW to RHR HX B Isolation
14EGG07BC	3617	EGHV0102	C	5.2.11	CCW to RHR HX B Isolation
14EGG09CC	3617	EGHV0071	C	5.2.10	CCW HX Out to RCS Ctmt Isolation
14EGG09CD	3617	EGHV0071	C	5.2.10	CCW HX Out to RCS Ctmt Isolation
14EGG10AC	3617	EGHV0062	C	5.2.10	CCW Return from RCP Thermal Barrier
14EGG10AD	3617	EGHV0062	C	5.2.10	CCW Return from RCP Thermal Barrier
14EGG18BC	3617	EGHV0127	C	5.2.10	CCW HX Out to RCS Bypass Isolation
14EGG18BD	3617	EGHV0127	C	5.2.10	CCW HX Out to RCS Bypass Isolation
14EGG18DC	3617	EGHV0133	C	5.2.10	EGHV0061 Bypass Valve
14EGG18DD	3617	EGHV0133	C	5.2.10	EGHV0061 Bypass Valve
14EGI13BA	3617	EGPT0078	I	5.2.10	CCW Pumps B and D Discharge Press
14EGI15AA	3617	EGFT0062	I	5.2.10	CCW Flow from RCP Thermal Barriers
14EGI19BB	3617	EGFT0129	I	5.2.10	CCW to RCP Flow Transmitter
14EGK16BA	3617	EGTV0030	C	5.2.10	CCW B HX Bypass Valve
14EGK16BC	3617	EGTV0030	C	5.2.10	CCW B HX Bypass Valve
14EJB01BB	3617	DPEJ01B	C	5.2.11	RHR Pump B Motor
14EJG04BC	3617	EJHV8804B	C	5.2.11	RHR B Supply To SI Pump B Iso Valve
14EJG06BC	3617	EJHV8811B	C	5.2.20	Containment Recirc Sump Iso Valve
14EJG08BC	3617	EJFCV0611	C	5.2.11	RHR Pump B Miniflow Valve
14EJG09AC	3617	EJHV8840	C	5.2.11	RHR to RCS Hot Leg Loops 2 and 3
14EJG09AD	3617	EJHV8840	C	5.2.11	RHR to RCS Hot Leg Loops 2 and 3
14EJG09BC	3617	EJHV8809B	C	5.2.11	RHR to RCS Cold Leg Loops 3 & 4
14EJG09BD	3617	EJHV8809B	C	5.2.11	RHR to RCS Cold Leg Loops 3 & 4

Table C-30-3
PFSSD Cables Located in Fire Area C-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EMB01BB	3617	DPEM01B	C	5.2.22	Train B Safety Injection Pump Motor
14EMG02BC	3617	EMHV8803B	C	5.2.23	Charging Pump B to BIT Inlet Isolation Valve
14EMK04CA	3617	EMHV8843	C	5.2.23	Boron Injection Upstream Test Line
14EMK04EA	3617	EMHV8871	C	5.2.23	SI Test Line from BIT
14ENB01BB	3617	DPEN01B	C	5.2.24	Containment Spray Pump B Motor
14ENG03BC	3617	ENHV0012	C	5.2.24	Containment Spray Pump B Isolation Valve
14ENG03BD	3617	ENHV0012	C	5.2.24	Containment Spray Pump B Isolation Valve
14EPG02CE	3617	EPHV8808B	C	5.2.25	Accumulator Tank B Outlet Iso Valve
14EPG02DE	3617	EPHV8808D	C	5.2.25	Accumulator Tank D Outlet Iso Valve
14FCK21AA	3617	FCFV0310	C	5.2.26	TDAFP Steam Trap Isolation Valve
14GDG01BF	3617	DCGD01B	C	5.2.21	ESW Pump Room Supply Fan B Motor (GDHS0011)
14GDY01BA	3617	CGD01B	C	5.2.21	Train B ESW Pump Room Supply Fan
14GDY01BB	3617	CGD01B	C	5.2.21	Train B ESW Pump Room Supply Fan
14GDY01BD	3617	CGD01B	C	5.2.21	ESW Pump Room B Supply Fan
14GFG01BC	3617	DSGF02B	C	5.2.8	AFW Pump B Room Cooler Motor
14GKG02BA	3617	SGK04B	P	5.2.27	Control Room A/C Unit B
14GKG02BE	3617	SGK04B	C	5.2.27	Control Room A/C Unit B
14GKG02BF	3617	SGK04B	C	5.2.27	Control Room A/C Unit B (GKHS0040)
14GKG13BE	3617	SGK05B	C	5.2.28	Class 1E Elec. Equip. Room A/C Unit B
14GKG13BF	3617	SGK05B	C	5.2.28	Class 1E Elec. Equip. Room A/C Unit B
14GKG13BG	3617	SGK05B	C	5.2.28	Class 1E Elec. Equip. Room A/C Unit B

Table C-30-3
PFSSD Cables Located in Fire Area C-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GKG13BK	3617	SGK05B	C	5.2.28	Class 1E Elec. Equip. Room A/C Unit B (GKHS0103)
14GKG13BL	3617	SGK05B	C	5.2.28	Class 1E Elec. Equip. Room A/C Unit B (GKHS0103)
14GKG13BM	3617	SGK05B	C	5.2.28	Class 1E Elec. Equip. Room A/C Unit B (GKHS0103)
14GKY02BA	3617	GKHZ0040A/B	C	5.2.27	Control Room A/C Unit 4B Supply/Discharge Dampers
14GKY02BB	3617	GKHZ0040B	C	5.2.27	Control Room A/C Unit 4B Discharge Damper
14GKY02BC	3617	GKHZ0040A	C	5.2.27	Control Room A/C Unit 4B Supply Damper
14GKY02BD	3617	GKHZ0040A/B	C	5.2.27	Control Room A/C Unit 4B Supply/Discharge Dampers
14GKY02BE	3617	GKHZ0040A/B	P	5.2.27	Control Room A/C Unit 4B Supply/Discharge Dampers
14GLG06BA	3617	DSGL11B	P	5.2.10	CCW Pump B Room Cooling Fan Motor
14GLG06BC	3617	DSGL11B	C	5.2.10	CCW Pump B Room Cooling Fan Motor (GLHIS0023)
14GLG06BD	3617	DSGL11B	C	5.2.10	CCW Pump B Room Cooling Fan Motor
14GMG01BH	3617	GMHS0011B	C	5.2.29	Train B Diesel Generator Room Supply Fan Isolation Switch
14GMK04BA	3617	GMHZ0019	C	5.2.29	Train B DG Room Exhaust Damper
14GMK04BB	3617	GMHZ0019	C	5.2.29	Train B DG Room Exhaust Damper
14GMK04BE	3617	GMHZ0019	C	5.2.29	Train B DG Room Exhaust Damper
14GNG02BD	3617	DSGN01B	C	5.2.30	Containment Cooler B Motor
14GNG02BH	3617	DSGN01B	C	5.2.30	Containment Cooler B Motor
14GNG02BJ	3617	DSGN01B	C	5.2.30	Containment Cooler B Motor

Table C-30-3
PFSSD Cables Located in Fire Area C-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GNG02BK	3617	DSGN01B	C	5.2.30	Containment Cooler B Motor
14GNG02DD	3617	DSGN01D	C	5.2.30	Containment Cooler D Motor
14GNG02DH	3617	DSGN01D	C	5.2.30	Containment Cooler D Motor
14GNG02DJ	3617	DSGN01D	C	5.2.30	Containment Cooler D Motor
14GNG02DK	3617	DSGN01D	C	5.2.30	Containment Cooler D Motor
14GNI05DA	3617	GNPT0934	I	5.2.2	Containment Atmosphere Pressure Transmitter
14JEG01BB	3617	DPJE01B	C	5.2.29	Train B Emergency Fuel Oil Transfer Pump Motor
14JEG01BD	3617	DPJE01B	C	5.2.29	Train B Emergency Fuel Oil Transfer Pump Motor
14JEG01BE	3617	DPJE01B	C	5.2.29	Train B Emergency Fuel Oil Transfer Pump Motor
14JEI04BA	3617	JELT0021	I	5.2.29	Train B Emergency Fuel Oil Day Tank Level
14KJK03AH	3617	KKJ01B	C	5.2.29	Train B EDG
14KJK03AJ	3418	KKJ01B	C	5.2.29	Train B EDG
14KJK03AK	3617	KKJ01B	C	5.2.29	Train B EDG
14KJK07AE	3617	NE106	C	5.2.29	Train B EDG Control Panel
14NBB04AB	3617	NBHS0011	C	5.2.31	NB02 Synchro-scope/Selector Switch
14NBB04AD	3617	NBHS0011	C	5.2.31	NB02 Synchro-scope/Selector Switch
14NBB04AE	3617	NBHS0011	C	5.2.31	NB02 Synchro-scope/Selector Switch
14NBB04AF	3617	NBHS0011	C	5.2.31	NB02 Synchro-scope/Selector Switch
14NBB05AC	3617	NBHS0008	C	5.2.31	XNB02 to NB0209 Synch Transfer Switch
14NBB06AC	3617	NBHS0009	C	5.2.31	XNB01 to NB0212 Synch Transfer Switch
14NBB14AA	3617	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control

Table C-30-3
PFSSD Cables Located in Fire Area C-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NBB14AB	3617	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AC	3617	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AE	3617	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AF	3617	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AG	3617	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB15AA	3617	NB00212	C	5.2.31	Bus NB02 Feeder Breaker NB0212 Control
14NBB15AC	3617	NB00212	C	5.2.31	Bus NB02 Feeder Breaker NB0212 Control
14NEB02AL	3617	NE106	C	5.2.29	Train B Diesel Generator Control Panel
14NEB11AA	3617	NB00211	C	5.2.29	Train B D/G Feeder Breaker NB0211 Control
14NEB11AD	3617	NB00211	C	5.2.29	Train B D/G Feeder Breaker NB0211 Control
14NEK13AD	3617	NE106	C	5.2.29	Train B D/G Control Panel
14NEK13AJ	3617	NE106	I	5.2.29	Train B D/G Control Panel
14NFK01AA	3617	NF039C	P	5.2.32	Load Shed / Sequencer Ch 1 & 4 Terms
14NFK01CA	3617	NF039A	C	5.2.32	Load Shed / Sequencer Ch 1 Logic
14NFK01DA	3617	NF039B	C	5.2.32	Load Shed / Sequencer Ch 4 Logic
14NFY01EA	3617	NF039A	C	5.2.32	Load Shed / Sequencer Ch 1 Logic
14NFY01FA	3617	NF039B	C	5.2.32	Load Shed / Sequencer Ch 4 Logic
14NFY01GA	3617	NF039A	P	5.2.32	Load Shed / Sequencer Ch 1 Logic
14NFY01HA	3617	NF039B	P	5.2.32	Load Shed / Sequencer Ch 4 Logic
14NGB10AB	3617	NB00213	C	5.2.33	Breaker NB0213 to XNG02 Control
14NGB10BB	3617	NB00210	C	5.2.33	Breaker NB0210 to XNG04 Control
14NGB10SA	3617	NB00216	C	5.2.33	Breaker NB0216 to XNG06 Control
14NGG01AD	3617	NG002B	P	5.2.33	Breaker NG0207 to NG02BAF1

Table C-30-3
PFSSD Cables Located in Fire Area C-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NGG01AE	3617	NG002B	P	5.2.33	Breaker NG0207 to NG02BAF1
14NGG01AJ	3617	DSGN01B	P	5.2.33	Containment Cooler Pump B Motor
14NGG01BB	3617	NG004C	P	5.2.33	Breaker NG0406 to NG04CMF1
14NGG01BC	3617	NG004C	P	5.2.33	Breaker NG0406 to NG04CMF1
14NGG01BF	3617	NG004T	P	5.2.33	Breaker NG0405 to NG04TAF1
14NGG11AA	3617	NG00201	C	5.2.33	Breaker NG0201 Control
14NGG11BA	3617	NG00401	C	5.2.33	Breaker NG0401 Control
14PKK11AA	3617	PK022	C	5.2.33	NG0409 Breaker Control
14RLK01AA	3617	NK04407	P	5.2.34	125 VDC to RC & Support Sys Control Panel (RL001/RL002)
14RLK01BA	3617	NK04409	P	5.2.34	125 VDC to Turbine Gen & Fdwtr Ctrl Pnl (RL005/RL006)
14RLK01CA	3617	NK04412	P	5.2.34	125 VDC to ESF Control Panel (RL017/RL018)
14RLK01DA	3617	NK04413	P	5.2.34	125 VDC to ESF Control Panel (RL019/RL020)
14RLK01EA	3617	NK04414	P	5.2.34	125 VDC to Reactor Auxiliary Control Pnl (RL021/RL022)
14RLK01FA	3617	NK04411	P	5.2.34	125 VDC to Turbine Gen & Fdwtr Ctrl Pnl (RL023/RL024)
14RPK15BA	3617	86XRP5	C	5.2.36	Control room lockout relay (RP335)
14RPK15CA	3617	86XRP6	C	5.2.36	Control room lockout relay (RP335)
14RPK15DA	3617	86XRP7	C	5.2.36	Control room lockout relay (RP335)
14RPY09BA	3617	RP053BC	P	5.2.35	120 VAC to BOP Instrumentation Rack from NN0416
14RPY09CA	3617	RP053BC	P	5.2.35	120 VAC to BOP Instrumentation Rack from NN0418

Table C-30-3
PFSSD Cables Located in Fire Area C-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14RPY10BA	3617	RP068	P	5.2.21	120 VAC to RP068 from NG02ACR136
14SAK21BA	3617	SA036B	P	5.2.8	125 VDC to SA036B from NK5409
14SAY21BA	3617	SA036B	P	5.2.8	120 VAC to SA036B from NN0403
14SAZ20EA	3617	GKHZ0040A/B	C	5.2.27	Status Panel SA066B Input from GKHZ0040A/B
14SAZ20GA	3617	SGK04B	C	5.2.27	Status Panel SA066B Input from SGK04B
14SAZ20HA	3617	SGK05B	C	5.2.28	Status Panel SA066B Input from SGK05B
14SAZ20NA	3617	SGK04B	C	5.2.27	Control Room A/C Unit
14SAZ20PA	3617	SGK05B	C	5.2.28	Status Panel SA066B Input from SGK05B
14SBS01DC	3617	SB029A	P	5.2.37	120 VAC to SSPS A Input Panel from NN0409
14SBS02DC	3617	SB032A	P	5.2.37	120 VAC to SSPS B Input Panel from NN0410
14SBS05BE	3617	SB032D	P	5.2.37	120 VAC to SSPS B Output Panel from NN0412
14SBS05BF	3617	SB032D	P	5.2.37	125 VDC to SSPS B Output Panel from NK4416
14SBS12BC	3617	SB102B	C	5.2.38	Train B Reactor Trip Switchgear Cabinet
14SBS16AA	3617	BBTI0423X	I	5.2.39	RCS Cold Leg Loop 2 Temp Ind at RP118B (WR)
14SBS16BA	3617	AELI0504A	I	5.2.6	SG D Wide Range Level Indicator at RP118B
14SBS16EA	3617	BBTI0443A	I	5.2.39	RCS Hot Leg Loop 4 Temp Ind at RP118B (WR)
14SBS16MA	3617	AELI0517X	I	5.2.6	SG A Narrow Range Level Indicator at RP118B
14SBS16NA	3617	BBPI0406X	I	5.2.39	RCS Wide Range Pressure Ind at RP118B
14SBS16PA	3617	AELI0537X	I	5.2.6	SG C Narrow Range Level Indicator at RP118B
14SBS16XA	3617	AELI0502A	I	5.2.6	SG B Wide Range Level Indicator at RP118B

Table C-30-3
PFSSD Cables Located in Fire Area C-30

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14SBS16YA	3617	AELI0504A	I	5.2.6	SG D Wide Range Level Indicator at RP118B
14SBS16ZA	3617	BBLI0460B	I	5.2.39	Pressurizer Level Indicator (NR) at RP118B
14SBY09FA	3617	SB041	P	5.2.37	120 VAC to Process Protection Rack 4 from NN0414
14SES07BA	3617	SENY0061B	P	5.2.40	Source Range Monitoring
14SES07BC	3617	SENY0061B	I	5.2.40	Source Range Monitoring
14SES07CA	3617	SENY0061A	P	5.2.40	Source Range Monitoring
16EJI12BA	3617	EJHCV0607	I	5.2.11	RHR B Heat Exchanger Outlet Flow Control (EJHY0607)
16PGG13DA	3617	PG2001	C	5.2.42	Load Center PG20 Feeder Breaker
16PNY02AA	3617	PN410	P	5.2.44	120 VAC Power from PN04 (Hot Side)
16PNY02AB	3617	PN410	P	5.2.44	120 VAC Power from PN04 (Neutral)
16RLY01DA	3617	PN00833	P	5.2.11	120 VAC to ESF Control Panel (RL017/RL018)
16RLY01EA	3617	PN00835	P	5.2.41	120 VAC to Reactor Auxiliary Control Pnl (RL021/RL022)
16RLY01GA	3617	PG020GBR217	P	5.2.3	120 VAC to Turbine Generator & Feedwater Control Panel (RL023/RL024)

5.2.1 Steam Generator Atmospheric Relief Valves

PFSSD requires at least two steam generator atmospheric relief valves (ARVs) be controlled and the other two closed. The ARVs are pneumatically operated using air from the compressed air system (KA) or nitrogen from the nitrogen accumulators. The valves open by pneumatic pressure and close by spring action. The valves are automatically controlled by a pressure transmitter installed on the outlet side of the steam generator. Alternatively, each valve can be controlled manually from the control room or the auxiliary shutdown panel by placing the pressure indicating controller (PIC) in manual.

As discussed in Section 5.2.8, a fire in this area could affect the Train B motor driven auxiliary feedwater pump (MDAFP) and the turbine driven auxiliary feedwater pump (TDAFP). Therefore, only the Train A MDAFP is available to feed steam generators B and C. Consequently, steam generator ARVs ABPV0001 and ABPV0004 need to be isolated and steam generator ARVs ABPV0002 and ABPV0003 need to be controlled.

Cables associated with steam generator ARV ABPV0004 are run in area C-30. Damage to these cables could prevent isolating ABPV0004 from the control room. If this occurs, an operator can close it by isolating air and nitrogen supply valves KAV1429 and KAV1365, respectively in fire area A-23. Cables for the remaining ARVs are not run in area C-30 and, therefore, the PFSSD function for controlling two steam generators is satisfied.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

Based on the above discussion, steam generator atmospheric relief valve control can be achieved.

References: E-15000, XX-E-013, E-13AB20B, E-1F9101, M-12AB01

5.2.2 Safety Injection and Containment Spray

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. A spurious containment spray actuation signal (CSAS) could cause the containment spray pumps to operate, depleting inventory in the RWST. These conditions are not desirable for PFSSD at Wolf Creek.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Containment spray (CS) is initiated automatically by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937.

A cable associated with containment pressure transmitter GNPT0934 is run in area C-30. Cables associated with the remaining containment pressure transmitters are not run in area C-

30. Therefore, a spurious CSAS cannot occur due to a fire in this area. Also, a spurious SIS due to high containment pressure cannot occur.

A cable associated with pressurizer pressure transmitter BBPT0458 is run in area C-30. Cables associated with the remaining pressurizer pressure transmitters do not run in area C-30. Consequently, a fire in area C-30 cannot cause a spurious SIS due to low pressurizer pressure.

Cables associated with steam line pressure transmitters ABPT0516 and ABPT0546 are run in area C-30. Cables associated with the remaining steamline pressure transmitters do not run in area C-30. Consequently, a spurious two out of three logic for low steam line pressure initiation of SIS cannot be satisfied if a fire occurs in area C-30.

Based on the above discussion, a spurious SIS and CSAS cannot occur if a fire occurs in this area.

References: E-15000, XX-E-013, E-13AB21, E-13BB16, E-13GN05, E-1F9431, E-1F9432, E-1F9433, M-12AB01, M-12BB02, M-12GN01

5.2.3 Main Steam Isolation Valves Downstream Components

Cables for several main steam (AB) valves located downstream of the main steam isolation valves (MSIVs) are located in this area. These valves are used for PFSSD to isolate the main steam lines in the event the MSIVs or MSIV bypass valves fail to close. Damage to these cables could cause the associated component to fail open.

Cable 16RLY01GA supplies 120 VAC power to control room panel RL023/RL024. At RL023/RL024, the power is split and supplies power to FCHV0103, ABLV0050 and ABLV0052, as well as other non-PFSSD components. These components are required to be functional for PFSSD in the event the MSIVs and MSIV bypass valves cannot be isolated. Loss of power will cause the valves to remain open.

As discussed in Sections 5.2.4 and 5.2.5, the MSIVs and the MSIV bypass valves can be isolated using hand switch ABHS0080 if a fire occurs in area C-30. Therefore, these downstream valves can fail open with no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-13AB08, E-13AB11A, E-13AB11B, E-13AB11C, E-13RL01, E-13RL07, E-1F9103, E-1F9424E, M-12AB03

5.2.4 Main Steam Isolation Bypass Valves

Each of the four MSIV bypass valves (ABHV0012, ABHV0015, ABHV0018 and ABHV0021) has two redundant solenoids that control the position of the associated valve. The bypass valves are normally closed with the solenoids de-energized. Both solenoids need to be energized to open the valve. One of the solenoids on each valve is on separation group 1 (Train A) and are controlled by hand switch ABHS0080. The other solenoids on each valve are on separation group 4 (Train B) and are controlled by hand switch ABHS0079.

Separation group 4 MSIV bypass solenoid valve cables are run in this area. Damage to these cables could impact the ability to close the valves using hand switch ABHS0079. Redundant means are available to ensure the MSIV bypass valves are closed. Hand switch ABHS0080 is unaffected by the fire and can be used to close the bypass valves if they are open at the time of the fire.

References: E-15000, XX-E-013, E-13AB23B, E-1F9101, M-12AB02

5.2.5 Steam Generator Main Steam Isolation Valves (MSIVs)

PFSSD requires the MSIVs be closed to prevent reactivity addition due to uncontrolled cooldown. The MSIVs are closed from the control room using all close hand switches ABHS0079 or ABHS0080.

Each MSIV is designed to utilize system fluid (main steam) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main steam. This is done by actuating either all close hand switch ABHS0079 (separation group 4) or ABHS0080 (separation group 1) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MSIV	ABHS0079 (Sep Group 4)		ABHS0080 (Sep Group 1)	
	Solenoids	Cable	Solenoids	Cable
ABHV0011	MV2, MV4, MV6	14ABK28BH	MV1, MV3, MV5	11ABK29BH
ABHV0014	MV2, MV4, MV6	14ABK29AH	MV1, MV3, MV5	11ABK28AH
ABHV0017	MV2, MV4, MV6	14ABK28AH	MV1, MV3, MV5	11ABK29AH
ABHV0020	MV2, MV4, MV6	14ABK29BH	MV1, MV3, MV5	11ABK28BH

All 4 cables associated with the 12 separation group 4 solenoid valves are run in area C-30. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 1 cables associated with hand switch ABHS0080 are unaffected by a fire in area C-30. Therefore, hand switch ABHS0080 is available to close the four MSIVs.

Cable 14ABK30BB provides 125 VDC power to Train B main steam and feedwater isolation actuation system (MSFIS) cabinet SA075B from NK5423. Damage to this cable would disrupt power to the separation group 4 solenoids and close the MSIVs, which is the desired PFSSD position. In addition, the Train A MSFIS is unaffected by the fire and ABHS0080 is available to close the MSIVs.

Based on the above discussion, hand switch ABHS0080 is available to close the MSIVs in the event of a fire in area C-30.

References: E-15000, XX-E-013, E-13AB27, E-13AB28, E-13AB29, E-13AB30, E-1F9101, M-12AB02

5.2.6 Steam Generator Level Indication

The decay heat removal function for PFSSD requires the use of two RCS loops and two Steam Generators. Steam generator (SG) level indication is required to support this function. A fire in area C-30 uses MDAFP A to supply SGs B and C. Therefore, level indication on steam generators B and C is required.

Cables associated with SGs B and C level transmitters AELT0527 (SGB NR) and AELT0537 (SGC NR) run in this area. Damage to these cables could prevent accurate level indication on AELI0527 and AELI0537 in the main control room. Cables associated with the remaining level transmitters on steam generators B and C do not run in this area. Therefore, level indication will be available on steam generators B and C using the following level transmitters:

Steam Generator	Available Level Indication
B	AELI0502 (WR), AELI0528 (NR), AELI0529 (NR), AELI0552 (NR)
C	AELI0503 (WR), AELI0538 (NR), AELI0539 (NR), AELI0553 (NR)

Cables associated with SGs A, B, C and D level indication at the auxiliary shutdown panel (ASP) are run in fire area C-30. The ASP is not credited if a fire occurs in this area so loss of indication at the ASP will have no adverse impact on PFSSD.

Based on the above discussion, steam generator B and C level indication is assured if a fire occurs in area C-30.

References: E-15000, XX-E-013, E-13AE08, E-13SB16, E-1F9203, M-12AE02

5.2.7 Steam Generator Main Feedwater Isolation Valves

PFSSD requires that either the main feedwater isolation valves (MFIVs) be closed, or the main feedwater pumps be stopped to prevent overfilling the steam generators. Flow diversion from auxiliary feedwater (AFW) to the main feedwater system piping is prevented by check valves AEV0420, AEV0421, AEV0422 and AEV0423. Closure of the main feedwater isolation valves is not required to prevent AFW flow diversion.

Each MFIV is designed to utilize system fluid (feedwater) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main feedwater. This is done by actuating either all close hand switch AEHS0080 (separation group 1) or AEHS0081 (separation group 4) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MFIV	AEHS0080 (Sep Group 1)		AEHS0081 (Sep Group 4)	
	Solenoids	Cable	Solenoids	Cable
AEFV0039	MV1, MV3, MV5	11AEK16AH	MV2, MV4, MV6	14AEK17AH
AEFV0040	MV1, MV3, MV5	11AEK17AH	MV2, MV4, MV6	14AEK16AH
AEFV0041	MV1, MV3, MV5	11AEK16BH	MV2, MV4, MV6	14AEK17BH
AEFV0042	MV1, MV3, MV5	11AEK17BH	MV2, MV4, MV6	14AEK16BH

All 4 cables associated with the 12 separation group 4 solenoid valves are run in area C-30. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 4 cables associated with hand switch AEHS0080 are unaffected by a fire in area C-30. Therefore, hand switch AEHS0080 is available to close the four MFIVs.

Cable 14ABK30BB provides 125 VDC power to Train B main steam and feedwater isolation actuation system (MSFIS) cabinet SA075B from NK5423. Damage to this cable would disrupt power to the separation group 4 solenoids and close the MFIVs, which is the desired PFSSD position. In addition, the Train A MSFIS is unaffected by the fire and AEHS0080 is available to close the MFIVs.

Based on the above discussion, MFIV isolation is assured using hand switch AEHS0080.

References: E-15000, XX-E-013, E-13AB30, E-13AE14, E-13AE15, E-13AE16, E-13AE17, E-1F9201, J-104-00296, M-12AE02, M-630-00044

5.2.8 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire AFW demand to achieve cold shutdown.

Motor operated valves (MOVs) in the system allow operators to line up the auxiliary feedwater system as required to achieve and maintain safe shutdown. Damage to the MOV circuits due to a fire could prevent operators from lining up the system from the control room.

Several PFSSD cables associated with various components of the auxiliary feedwater system (AL) run through fire area C-30. These cables are identified in Table C-30-3. Damage to these cables could prevent operation of the TDAFP and the Train B MDAFP. In addition, motor operated valves in the flowpath from the Train B MDAFP to steam generators A and D and from the TDAFP to steam generators B and C could spuriously close. Cables associated with the Train A MDAFP, as well as the suction and discharge valves, are unaffected by a fire in this area.

Panels SA036A, SA036B and SA036C monitor pressure transmitter signals on ALPT0037, ALPT0039 and ALPT0038, respectively. A spurious low CST pressure due to fire damage to cables associated with two of these pressure transmitters could swap the water source to ESW. This is only a commercial concern and should be prevented if possible. An instrument cable associated with ALPT0039 runs in this area. Damage to this cable could cause a spurious low CST pressure signal but will not initiate swapover to the ESW system since cables for the remaining two pressure transmitters are unaffected.

Power cables associated with SA036B are run in this area. Damage to these cables could result in a loss of power to the panel but panels SA036A and SA036C remain available. Therefore, automatic operation of low suction pressure (LSP) swapover is available.

A cable associated with the Train B MDAFP room cooler is run in this area. Damage to this cable could prevent operation of the cooler. The Train A MDAFP room cooler is unaffected.

Based on the above discussion, auxiliary feedwater is assured if a fire occurs in area C-30 using Train A MDAFP supplying auxiliary feedwater to steam generators B and C.

References: E-15000, XX-E-013, E-13AL01A, E-13AL01B, E-13AL02B, E-13AL03A, E-13AL03B, E-13AL04B, E-13AL05A, E-13AL05B, E-13AL07B, E-13AL08, E-13AL09, E-13GF01, E-13SA21, E-1F9202, E-1F9203, E-1F9204, E-1F9402A, E-1F9402B, E-1F9444, J-10SA, M-12AL01, M-12GF01

5.2.9 Reactor Coolant Pump (RCP) Seal Injection

PFSSD requires RCP seal injection to provide a boron injection path, provide makeup to the RCS to maintain hot standby inventory and prevent damage to the RCP seals. The Component Cooling Water (CCW) system is an alternative means of cooling the RCP seals.

A fire in area C-30 could damage power and control cables associated with all four RCP seal injection valves (BBHV8351A, BBHV8351B, BBHV8351C and BBHV8351D). The seal injection valves are normally open and de-energized with the circuit breaker maintained in the OFF position. The valves are not high/low pressure interface valves so three-phase hot shorts do not have to be considered and, consequently, damage to the power cables will not cause the valves to spuriously close. Damage to the control cables will not cause the valves to close because the power and control circuits are de-energized. Therefore, a fire in this area will not cause the seal injection valves to close.

Cable 14BGG52BC is associated with centrifugal charging pump (CCP) B to RCP seal injection valve BGHV8357B. Redundant Train A CCP to RCP seal injection valve BGHV8357A is unaffected.

Cable 14BGI51BA is associated with RCP seal total flow transmitter BGFT0215B. Damage to this cable could cause a loss of seal flow indication on BGFI0215B. RCP seal total flow indicator BGFI0215A is unaffected by a fire in area C-30 and can be used to diagnose a loss of RCP seal injection.

Based on the above discussion, RCP seal injection is unaffected. RCP seal total flow indicator BGFI0215A can be used to diagnose a loss of RCP seal injection in the event of a loss of the operating charging pump.

References: E-15000, XX-E-013, E-13BB04, E-13BG51, E-13BG52, E-1F9102, E-1F9302, E-1F9303, M-12BB03, M-12BG03

5.2.10 Component Cooling Water

The component cooling water system is required for PFSSD to provide cooling water to the CCP oil coolers, seal water heat exchanger, RHR heat exchanger and RHR pump seal cooler. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Cables associated with components on the Train B CCW system run through area C-30. Damage to these cables due to a fire could prevent operation of the associated equipment and prevent operation of Train B CCW. Cables associated with redundant Train A CCW are run in a different fire area and are unaffected by the fire.

Cables associated with Train B CCW pump room cooler SGL11B run in area C-30. Damage to these cables could prevent operation of the unit. Cables associated with redundant Train A CCW and room cooler SGL11A are run in a different fire area and are unaffected by the fire.

To ensure an operable flow path from CCW to the RCP thermal barriers, either valves EGHV0071 or EGHV0126 must be open and either EGHV0058 or EGHV0127 must be open. In addition, either valves EGHV0062 or EGHV0132 must be open and either EGHV0061 or EGHV0133 must be open. Also, when operating the Train A CCW system, valve EGHV0015 needs to be open to ensure a return flow path to the suction side of the CCW pumps and EGHV0053 needs to be open to ensure CCW flow to the service loop.

Cables associated with valves EGHV0062, EGHV0071, EGHV0127 and EGHV0133 run through area C-30. If the fire affects cables associated with EGHV0062 and EGHV0071, the valves may spuriously close. If this occurs, Operators could open valves EGHV0132 and

EGHV0126 using associated hand switches EGHIS0132 and EGHIS0126 on RL020 to restore thermal barrier cooling.

If the Train B CCW system is operating at the time of the fire, operators may need to swap to Train A CCW using hand switches in the control room. If the Train A CCW system is operating at the time of the fire, the CCW system is in the protected lineup except that EGHV0126 and/or EGHV0132 may need to be opened from the control room.

Cable 14EGI19BB is associated with CCW to RCP flow transmitter EGFT0129. Damage to this cable could prevent operators from diagnosing a loss of CCW flow to the RCP thermal barriers using flow indicator EGFI0129. CCW to RCP flow indicator EGFI0128 is unaffected by a fire in area C-30 and can be used to diagnose a loss of CCW flow to the RCP thermal barriers.

Based on the above discussion, Train A CCW is available to provide cooling to essential PFSSD components as well as provide cooling to the RCP thermal barriers. Loss of CCW flow to the RCP thermal barriers can be diagnosed using flow indicator EGFI0128.

References: E-15000, XX-E-013, E-13EG01C, E-13EG01D, E-13EG05A, E-13EG05B, E-13EG05D, E-13EG09, E-13EG10, E-13EG13, E-13EG15, E-13EG16, E-13EG18, E-13EG18A, E-13EG19, E-13GL06, E-1F9303, E-1F9401A, E-1F9401B, E-1F9444, M-12EG01, M-12EG02, M-12EG03, M-12GL02

5.2.11 Residual Heat Removal (RHR)

PFSSD requires one train of residual heat removal (RHR) to be available for shutdown cooling. The RHR system is not used for hot standby.

Hot shutdown requires isolation of the RCS to RHR flow path by maintaining either BBPV8702A or EJHV8701A closed and either BBPV8702B or EJHV8701B closed. Cold shutdown requires RHR taking suction from the RCS. RHR pump suction from the RCS is controlled by valves BBPV8702A and EJHV8701A (Train A) and BBPV8702B and EJHV8701B (Train B). The PFSSD methodology credits Train A RHR to achieve cold shutdown if a fire occurs in area C-30.

A control cable associated with RHR pump B (PEJ01B) could be damaged, causing a spurious pump start or preventing the pump from being started. Cables associated with RHR pump A are unaffected by a fire in area C-30.

Cables 14BBG12AF and 14BBG12AG are control cables associated with BBPV8702A. An inter-cable (cable-to-cable) hot short between cables 14BBG12AF and 14BBG12AG will bypass the control room hand switch and provide the permissive to open BBPV8702A. Valve EJHV8701A will remain closed since cables associated with this valve are not run through area C-30. Furthermore, BBPV8702A and EJHV8701A are administratively maintained closed with the breaker locked open. The 3-phase power cables associated with both valves are not run in this area, so a 3-phase hot short is not credible.

Cables 14BBG12BF and 14BBG12BG are control cables associated with BBPV8702B. An inter-cable (cable-to-cable) hot short between cables 14BBG12BF and 14BBG12BG will bypass the control room hand switch and provide the permissive to open BBPV8702B. Valve EJHV8701B will remain closed since cables associated with this valve are not run through area C-30. Furthermore, BBPV8702B and EJHV8701B are administratively maintained closed with the breaker locked open. The 3-phase power cables associated with both valves are not run in this area, so a 3-phase hot short is not credible.

An open circuit in cable 14BBG12AF could prevent remote opening of valve BBPV8702A when transitioning to RHR Train A. If this occurs, a cold shutdown repair or a containment entry will be necessary to open the valve. Valve EJHV8701B can be controlled from the control room.

Valve EGHV0101 is the Train A CCW to RHR Heat Exchanger control valve. Valve EGHV0102 is the Train B CCW to RHR Heat Exchanger control valve. These valves are normally closed during power operation. PFSSD requires that the valve on the operating train of CCW be closed until shutdown cooling mode is entered, at which time the valve on the operating train of RHR needs to be open. As stated in Section 5.2.10, the Train B CCW system may not be available to supply cooling water to the Train B RHR heat exchanger. Cables 14EGG07BA, 14EGG07BB and 14EGG07BC are associated with valve EGHV0102. Damage to the cables could prevent operation of EGHV0102 and damage to cable 14EGG07BC could cause the valve to spuriously open. Valve EGHV0101 is unaffected by a fire in this area.

When RHR pumps are operating, the associated mini-flow valve (EJFCV0610 or EJFCV0611) needs to be controlled. The mini-flow valves prevent RHR pump overheating by re-circulating water from the discharge side of the RHR heat exchanger to the suction side of the RHR pump. The mini-flow valve opens when the flow indicator measures low flow and closes on high flow. Damage to cable 14EJG08BC could prevent mini-flow valve EJFCV0611 from operating properly. If the Train B RHR pump spuriously starts and EJFCV0611 fails to operate, the pump could be damaged. This is a commercial concern only since Train A RHR pump and mini-flow valve EJFCV0610 are unaffected by a fire in this area.

The RHR heat exchanger discharge control valve on the operating train (EJHCV0606 (Train A) or EJHCV0607 (Train B)) needs to be available. Cable 16EJI12BA, which is associated with EJHCV0607, runs through area C-30. Cable 16RLY01DA provides 120 VAC power to RL017/RL018 (EJHY0607) from PN0833. Damage to these cables could result in a loss of valve EJHCV0607. Valve EJHCV0606 is unaffected by a fire in this area.

RHR pump A discharge to CVCS control valve EJHV8804A needs to be closed when operating the Train A RHR system. RHR pump B discharge to SI Pump B control valve EJHV8804B needs to be closed when operating the Train B RHR system. Damage to cable 14EJG04BC could cause valve EJHV8804B to spuriously open. The Train A RHR system is credited for a fire in this area so spurious opening of EJHV8804B will have no adverse impact on PFSSD. Cables associated with EJHV8804A do not run in area C-30.

Cables associated with Train B RHR pump discharge to RCS cold leg isolation valve EJHV8809B run in area C-30. Damage to these cables could prevent operating the valve from the control room. Cables associated with Train A RHR pump discharge to RCS cold leg isolation valve EJHV8809A do not run in area C-30. Consequently, valve EJHV8809A is unaffected by a fire in area C-30.

The cold shutdown mode of PFSSD requires isolation of hot leg recirculation. Valve EJHV8840 is used to isolate RHR flow to the RCS hot leg loops 2 and 3. This valve is normally closed and is required to be closed for cold shutdown. During hot standby, the valve can be in any position. Cables associated with valve EJHV8840 run through area C-30. Damage to cables 14EJG09AC and 14EJG09AD would likely result in valve EJHV8840 remaining in its as-is normally closed position, which is the preferred PFSSD position. However, two proper intra-cable hot shorts in cable 14EJG09AD or one intra-cable hot short in cable 14EJG09AD combined with a short to ground on conductor U1 would spuriously open the valve.

As stated above, the position of valve EJHV8840 (open or closed) will not affect hot standby. The valve needs to be closed for cold shutdown. The valve has been modified to address NRC IN 92-18 and can be closed manually prior to entering shutdown cooling mode. The torque and limit switches are not bypassed by postulated damage to these cables.

Based on the above discussion, the Train B RHR system could be affected by a fire in this area but the Train A RHR system is available. Valve BBPV8702A may need to be manually opened

and valve EJHV8840 may need to be manually closed when transitioning to Train A RHR for shutdown cooling.

References: E-15000, XX-E-013, E-13BB12A, E-13BB12B, E-13EG07A, E-13EJ01, E-13EJ04B, E-13EJ08, E-13EJ09C, E-13EJ12, E-13RL01, E-13RL04, E-1F9205, E-1F9301, E-1F9401A, E-1F9421, M-12BB01, M-12EJ01

5.2.12 Pressurizer Power Operated Relief Valves and Associated Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed. Cables and components associated with PORV BBPCV0456A and associated block valve BBHV8000B are run through area C-30. Cables and components associated with PORV BBPCV0455A and associated block valve BBHV8000A are not located in area C-30.

The pressurizer PORVs are not considered high/low pressure interfaces. The valves are supplied power by an ungrounded 125 VDC system. Therefore, based on GL 86-10, consideration of multiple proper polarity hot shorts is not required. A single proper polarity hot short still needs to be considered.

In the event a fire causes BBPCV0456A to open and damages BBHV8000B cables, Operators can close BBPCV0456A by placing hand switch BBHIS0456A, located on RL021, in the close position. Pressurizer level and RCS pressure indication are available to diagnose a failed open PORV using BBLI0459A and BBPI0405, respectively. In addition, pressurizer pressure indication is available using BBPI0455A, BBPI0456 and BBPI0457.

An instrument cable (14BBI16NB) associated with pressurizer pressure transmitter BBPT0458 is run in fire area C-30. Damage to this cable could send a spurious high-pressure signal to the pressure control system. However, as discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure channel will not cause the spurious operation of the pressurizer PORVs.

Based on the above discussion, pressurizer PORV BBPCV0456A could spuriously open due to damage to the PORV control cables and block valve BBHV8000B may not close due to cable damage. The PORV can be closed using hand switch BBHIS0456A in the main control room.

References: XX-E-013, E-15000, M-12BB02, E-13BB39, E-13BB40, E-13BB16, E-1F9301, E-1F9421, CR 13079, DCP 12944, DCP 13324

5.2.13 Reactor Coolant System (RCS) Pressure Indication

The PFSSD design requires RCS pressure indication to be available. RCS pressure indication is provided in the control room using BBPI0405 or BBPI0406. A cable (14BBI16BB) associated with pressure transmitter BBPT0406 is located in fire area C-30. Damage to this cable could prevent RCS pressure indication on BBPI0406.

Cables associated with redundant RCS pressure transmitter BBPT0405 are unaffected by a fire in this area. Therefore, RCS pressure indication is available using BBPI0405.

References: E-15000, XX-E-013, E-13BB16, E-1F9201, E-1F9205, M-12BB04

5.2.14 Reactor Head Vent Valves

PFSSD requires that one of the two reactor vessel head vent valves on each flow path (2 flow paths total) be closed to prevent uncontrolled depressurization of the RCS. Either BBHV8001A or BBHV8002A and either BBHV8001B or BBHV8002B needs to be closed.

A cable (14BBK30DA) associated with one of the four head vent valves (BBHV8002B) runs through area C-30. Cables for remaining head vent valves BBHV8001A, BBHV8002A and BBHV8001B are not run through C-30 and are unaffected by the fire. Therefore, at least one valve on each flow path can be controlled and spurious opening of BBHV8002B will have no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-13BB30, E-1F9301, M-12BB04

5.2.15 Centrifugal Charging Pumps

At least one centrifugal charging pump (CCP) is required for PFSSD to provide RCP seal cooling, reactivity control and inventory control. These functions are accomplished using a CCP taking suction from the refuelling water storage tank (RWST) and injecting through the RCP seals. RCP seal injection provides approximately 20 gpm makeup to the RCS and provides adequate boron concentration to maintain sub-critical reactivity conditions. If RCP seal injection is unavailable, reactivity and inventory control is provided by lining up the CCPs to the boron injection tank (BIT). The normal charging pump (NCP) is not credited and is assumed lost.

A control cable associated with Train B Centrifugal Charging Pump (CCP) PBG05B runs through area C-30. Damage to this cable could prevent operation of the pump. Redundant Train A CCP cables are run in a separate fire area and are unaffected by a fire.

Control cables associated with Train B charging pump miniflow valve BGHV8111 are run through area C-30. Redundant Train A cables for miniflow valve BGHV8110 are run in a different area and are unaffected by a fire in area C-30.

Cables associated with RWST to charging pump B control valve BNLCV0112E are run in this area. Damage to these cables could prevent opening or cause spurious closure of the valve. Redundant valve BNLCV0112D is unaffected by a fire in area C-30.

Based on the above discussion, the Train A CCP is available if a fire occurs in area C-30.

References: XX-E-013, E-15000, E-13BG01A, E-13BG11C, E-13BN01A, E-1F9102, E-1F9302, E-1F9401A, M-12BG03, M-12BN01

5.2.16 Charging Flow to Regenerative Heat Exchanger Isolation Valves

PFSSD requires charging flow to be directed to the RCS through the RCP seals and/or the boron injection tank. To ensure adequate flow to the RCS, flow diversion to the regenerative heat exchanger needs to be prevented. Valves BGHV8105 and BGHV8106 are included in the PFSSD equipment list to accomplish this task. Manual valve BG8402B is also included to provide an alternate means of closing this flow path during alternate safe shutdown using OFN-RP-017.

A control cable associated with BGHV8105 is run in area C-30 and could be damaged by a fire, preventing valve BGHV8105 from being closed from the control room. Cables associated with valve BGHV8106, and its hand switch (BGHIS8106), are unaffected by a fire in area C-30. Therefore, valve BGHV8106 is available to isolate flow to the regenerative heat exchanger.

References: E-15000, XX-E-013, E-13BG11A, E-1F9102, E-1F9302, M-12BG03

5.2.17 Volume Control Tank (VCT) Discharge Valves

PFSSD requires isolation of the Volume Control Tank (VCT) discharge to charging pumps suction using either valve BGLCV0112B or BGLCV0112C. Power and control cables associated with BGLCV0112C are run in area C-30. Damage to these cables could prevent closing this valve from the control room. Cables associated with BGLCV0112B are unaffected by a fire in this area.

Cable 14BGI51DA is an instrumentation cable for VCT level transmitter BGLT0185. Damage to this cable could send a false VCT low-low level signal and close relay K647 on the close circuit for valve BGLCV0112C. This would fail the valve closed if all other permissives are met, which is the desired PFSSD position. Therefore, damage to this cable will have no adverse impact on the ability to isolate the VCT discharge flow path.

Based on the above discussion, valve BGLCV0112B can be isolated using BGHIS0112B in the main control room.

References: E-15000, XX-E-013, E-13BG12A, E-13BG51, E-1F9102, E-1F9302, M-12BG03

5.2.18 Excess Letdown

The excess letdown flowpath is required to be isolated to prevent uncontrolled depressurization of the RCS. Therefore, either normally closed valve BGHV8153A or BGHV8154A must be maintained closed and either normally closed valve BGHV8153B or BGHV8154B must be maintained closed.

One cable associated with BGHV8154B runs through fire area C-30. Therefore, the remaining valves are unaffected by a fire in area C-30 and will remain closed.

References: E-15000, XX-E-013, E-1F9301, E-13BG48, M-12BG01

5.2.19 Steam Generator Blowdown to Blowdown Flash Tank Isolation Valves

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown. Cables associated with these valves are run in area C-30. An open circuit in these cables will fail the valves closed, which is the desired PFSSD position. A hot short on these cables could prevent the valves from being closed using hand switches BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A in the main control room.

Redundant capability exists for closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004. The redundant means uses BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C, located on the BM157 panel in the radwaste control room. Access is available without traversing area C-30.

Although the configuration is not in literal compliance with 10CFR50, Appendix R, feasible manual actions are available and are unaffected by the fire.

Thermal hydraulic analysis WCNOC-CP-002 shows insignificant impact on SG inventory even with all four blowdown valves open. Therefore, no E-1F9900 OMA is required to close blowdown valves to achieve and maintain hot standby. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 34.

References: E-15000, XX-E-013, E-13BM06A, E-1F9101, M-12BM01

5.2.20 Refueling Water Storage Tank (RWST) and Containment Sump Isolation Valves

To prevent draindown of the RWST into the containment sump, PFSSD requires that either valve BNHV8812A or valve EJHV8811A and valve BNHV8812B or valve EJHV8811B be closed during hot standby. For cold shutdown, the operating train containment sump valve (EJHV8811A or EJHV8811B) must be maintained closed to prevent flow diversion from the RCS to the containment sump. Valves BNHV8812A and BNHV8812B are normally open and valves EJHV8811A and EJHV8811B are normally closed.

Cable 14BNG03BC, associated with valve BNHV8812B, runs through area C-22. Damage to this cable could prevent closing this valve from the control room or could cause the valve to spuriously close. In addition, cable damage could prevent the valve from automatically closing when valve EJHV8811B reaches full open position.

A control cable (14EJG06BC) associated with valve EJHV8811B runs through fire area C-30. Damage to this cable will not result in valve EJHV8811B opening as long as valve BNHV8812B remains open. If valve BNHV8812B is fully closed, it will provide a permissive for valve EJHV8811B to open. If valve EJHV8811B opens due to damage to cable 14EJG06BC, draindown will not occur since valve BNHV8812B is closed.

Cable 14BNI07FA, associated with RWST level transmitter BNLT0933, is run in area C-30. Circuits for the remaining three RWST level transmitters are not run in area C-30. Therefore, RWST level indication is available using BNLI0930, BNLI0931 and BNLI0932.

Based on the above discussion, draindown of the RWST to the containment sump is not credible if a fire occurs in area C-30.

References: E-15000, XX-E-013, E-13BN03A, E-13EJ06B, E-13BN07, E-1F9102, E-1F9204, E-1F9205, M-12BN01, M-12EJ01, M-10BN

5.2.21 Essential Service Water

Either the Train A or the Train B essential service water (ESW) system is required to be available to ensure PFSSD. The ESW system supplies water to the following PFSSD components on the associated train:

- CCP room cooler
- RHR pump room cooler
- Class 1E switchgear room A/C condenser
- diesel generator engine cooling
- control room A/C condenser
- auxiliary feedwater pump room cooler
- motor and turbine driven auxiliary feedwater pump suction (backup to CST)

- containment air coolers
- electrical penetration room cooler
- component cooling water pump room cooler
- component cooling water heat exchanger
- component cooling water system makeup

A number of components associated with Train B ESW system could be affected by a fire in this area. The Train B ESW pump and a number of Train B ESW control valves could spuriously operate or may not operate when required. The Train B ESW pump room supply fan and associated dampers may not operate. Therefore, the Train B ESW system cannot be relied on if a fire occurs in this area.

The service water system provides the normal source of water to the ESW piping. Service water supply to and return from the ESW piping is each controlled by two valves installed in series. One of the two valves on each leg is required to be closed for PFSSD to prevent flow diversion from the credited ESW system. As discussed in the previous paragraph, the Train B ESW system may not be available if a fire occurs in this area. One valve (EFHV0025) on the Train A service water to ESW piping supply line and one valve (EFHV0039) on the Train A ESW to service water return line may be affected by the fire and may not close on a signal from the control room. Redundant valves EFHV0023 and EFHV0041 are unaffected by the fire and will close on a signal from the control room. Therefore, the ESW/service water cross connects can be isolated if a fire occurs in this area. In addition, check valve EFV0470 is installed between valves EFHV0023 and EFHV0025 and will prevent flow diversion from Train A ESW to the service water system. Also, check valve EFV0471 is installed between valves EFHV0024 and EFHV0026 and will prevent flow diversion from Train B ESW to the service water system.

Cable 14RPY10BA supplies 120 VAC control power to the automatic and manual start circuits for the Train B ESW pump room supply fan CGD01B. The control power is supplied via this cable to control room panel RP068. If power is lost due to damage to this cable, then the Train B ESW pump room supply fan will not start either automatically, when the ESW pump starts, or manually from the control room. If this occurs, the Train A ESW pump room supply fan remains unaffected by the fire.

Cables 14GDY01BA, 14GDY01BB and 14GDY01BD are associated with Train B ESW pump room supply fan CGD01B. Damage to these cables could prevent operation of the supply fan. Train A ESW pump room supply fan CGD01A is unaffected by a fire in this area.

The Train A ESW system is unaffected by a fire in area C-30 and ESW remains available in the event of a fire in this area.

References: E-15000, XX-E-013, E-13EF02, E-13EF02A, E-13EF03, E-13EF04, E-13EF05, E-13EF06A, E-13EF07A, E-13EF08A, E-13EF09A, E-13EF11, E-13RP10, E-K3EF01A, E-K3EF08, E-K3GD01A, E-K3GD04, E-K3GD04A, J-201-00133, E-1F9402A, E-1F9402B, E-1F9403, E-1F9424B, E-1F9443, M-12EF01, M-12EF02, M-K2EF01, M-K2GD01

5.2.22 Safety Injection (SI) Pumps

The preferred PFSSD condition of the SI pumps is off. Therefore, a spurious start of the SI pumps should be avoided or mitigated. A control cable (14EMB01BB) associated with Train B SI pump PEM01B runs through area C-30 and could cause a spurious start of the pump and prevent stopping the pump from the control room.

If the Train B SI pump spuriously starts with the reactor at normal pressure, PFSSD will be assured. The pump will not discharge into the RCS due to the pressure differential between the RCS (approximately 2,235 psig) and the SI pump shutoff pressure (approximately 1,565 psig). In addition, the setpoint of the discharge relief valve (EM8853B) to the Recycle Holdup

Tank is 1,825 psig. Therefore, no inventory is lost from the RWST if the SI pumps spuriously start. With the SI pump operating with no flow, damage to the pump could occur, which is a commercial concern since the SI pump is not credited in the PFSSD analysis. If necessary, the pump can be stopped by opening breaker NB0202, but this action is not required for PFSSD.

Based on the above discussion, spurious operation of the Train B SI pump will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13EM01, E-1F9102, E-1F9302, M-12EM01, M-721-00096, WCRE-01

5.2.23 Boron Injection Tank Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

As discussed in Section 5.2.9, RCP seal injection is available in the event of a fire in area C-30. In addition, the letdown and excess letdown flowpaths can be isolated if a fire occurs in this area. Therefore, boration and inventory control through the BIT is not required to ensure PFSSD.

A cable associated with Train B BIT inlet valve EMHV8803B is run in this area. Damage to this cable could prevent opening the valve from the control room. Train B BIT outlet valve EMHV8801B is unaffected by a fire in this area. Cables associated with redundant Train A valve EMHV8803A are unaffected by a fire in this area. Therefore, BIT injection is available using the Train A CCP and valves EMHV8803A and EMHV8801A.

To prevent CCP flow diversion through the SIS test line when charging through the BIT, valves EMHV8843 and EMHV8882 need to be closed. If either or both of these valves cannot be closed, then closing or maintaining closed either valve EMHV8871 or EMHV8964 will prevent flow in the SIS test line. Cables associated with EMHV8843 and EMHV8871 are run in this area. Damage to these cables could cause the valves to open. Cables associated with EMHV8964 do not run in area C-30. Therefore, valve EMHV8964 can be controlled to prevent flow through the SIS test line when charging through the BIT.

Based on the above discussion, the BIT flowpath is available to provide a charging flowpath using the Train A CCP.

References: E-15000, XX-E-013, E-13EM02A, E-13EM02B, E-13EM02C, E-13EM04, E-13EM04A, E-1F9302, M-12EM01, M-12EM02

5.2.24 Containment Spray (CS) Pumps

Spurious start of the CS pumps may complicate PFSSD due to the possible depletion of inventory in the RWST. Therefore, a spurious start of the CS pumps should be avoided or mitigated. A control cable (14ENB01BB) associated with Train B CS pump PEN01B runs through area C-30 and could cause a spurious start of the pump. The cable damage could prevent stopping the pump from the control room.

Normally closed valve ENHV0012 could open due to damage to associated control cables. If this occurs coincident with a running Train B CS pump, water would flow from the containment spray nozzles, depleting inventory in the RWST.

The total flow in the containment spray system during injection phase with one pump operating is 3,165 gpm (M-10EN). Based on calculation XX-E-013, Appendix 1, a maximum of 214,260 gallons of water can be lost from the RWST to maintain sufficient volume to achieve cold shutdown.

As stated previously, level indication in the RWST is available, so operators have the ability to diagnose a reducing RWST inventory. The time available to mitigate containment spray is:

214,260 gallons / 3,165 gpm = 67.7 minutes

Based on the above discussion, there is 67.7 minutes available to mitigate containment spray. This is an OMA. Refer to E-1F9900 for details. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 16.

References: XX-E-013, E-15000, E-13EN01, E-13EN03, E-1F9102, E-1F9302, E-1F9424B, E-1F9433, M-10EN, M-12EN01

5.2.25 Safety Injection Accumulator Isolation Valves

PFSSD requires isolation of the SI accumulators prior to reducing RCS pressure below the injection pressure to avoid unnecessary accumulator discharge. This is accomplished by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. These valves are normally open with the MCC breaker administratively locked in the open position. Cables for valves EPHV8808B and EPHV8808D are run in area C-30.

Since the breakers for these valves are normally open, damage to these cables will not cause the valves to spuriously change position. However, damage to the cables will prevent closing the associated valve from the control room after power is restored.

The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig. If necessary, a containment entry can be made to manually close the valves.

References: E-15000, XX-E-013, E-13EP02A, E-1F9201, M-12EP01, CKL EP-120

5.2.26 TDAFP Steam Trap Drain Valve

Valve FCFV0310 is an isolation valve on the 1-inch steam trap line associated with the TDAFP. Solenoid valve FCFY0310 controls the position of valve FCFV0310. PFSSD requires this valve to be closed to prevent uncontrolled loss of steam through this flow path.

Cable 14FCK21AA is a control cable associated with valve FCFV0310. Inter or intra-cable hot shorts could cause the valve to spuriously open. There are no energized 125 VDC cables in the same conduit as cable 14FCK21AA, so inter-cable hot shorts causing the valve to open are not possible. An intra-cable hot short from conductor 2 to conductor 1 will energize the solenoid and open the valve. This can be mitigated by depressing the close pushbutton on hand switch FCHIS0310. However, since this is a momentary contact switch, the operator would have to maintain the button in the depressed position.

Uncontrolled blowdown through this 1-inch line is bounded by the main steam line break analysis and loss of steam through this line will not result in uncontrolled cooldown. Therefore, if the valve remains open, PFSSD is assured.

References: E-15000, XX-E-013, E-13FC21, E-1F9202, M-12FC02

5.2.27 Control Room Air Conditioning

Control room air conditioning is required to be available to satisfy the PFSSD support function. Two redundant and independent air conditioning units (SGK04A and SGK04B) are provided to satisfy this function. At least one unit is required to be available for PFSSD.

Several cables associated with Train B Control Room A/C Unit SGK04B and associated dampers are run in this area. Damage to these cables could prevent operation of the unit.

The Train A control room A/C unit is unaffected by a fire in this area. Therefore, control room air conditioning is available if a fire occurs in area C-30.

References: XX-E-013, E-15000, E-13GK02A, E-13GK02C, E-13GK02D, E-13SA20, E-1F9442, M-12GK01, M-622.1A-00007

5.2.28 Class 1E Electrical Equipment Room Air Conditioning

The PFSSD support function requires Class 1E electrical equipment air conditioning on the operating train of equipment. Class 1E electrical equipment air conditioning is provided by units SGK05A (Train A) and SGK05B (Train B).

Cables associated with Train B Class 1E electrical equipment room A/C unit SGK05B are run in area C-30. Damage to these cables could prevent operation of the unit.

Cables associated with Train A Class 1E electrical equipment room A/C unit SGK05A are unaffected by a fire in this area. Therefore, room cooling for Train A Class 1E electrical equipment remains available.

References: XX-E-013, E-15000, E-13GK13A, E-13SA20, E-1F9444, M-12GK03, M-622.1A-00002

5.2.29 Standby Diesel Generation

Cables associated with the Train B diesel generator are run in this area. Also, cables associated with the Train B diesel generator room exhaust damper GMHZ0019 run in this area. Damage to these cables could prevent operation of the Train B diesel generator.

A fire in area C-30 could cause a loss of several Train B components, however, Train A components are available and are unaffected by the fire. Based on calculation XX-E-013, off-site power is available on Train A if a fire occurs in area C-30. Therefore, neither diesel generator is required if a fire occurs in this area and mal-operation of the Train B diesel generator will have no adverse impact on safe shutdown.

References: XX-E-013, E-15000, E-12KJ01, E-13GM01A, E-13GM04A, E-13JE01, E-13JE01A, E-13JE04, E-13KJ03A, E-13KJ07, E-13NE11, E-13NE13, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, E-1F9444, M-12GM01, M-12JE01

5.2.30 Containment Coolers

PFSSD requires containment cooling to maintain the containment environment within EQ limits. Cables associated with Train B containment coolers are run in area C-30. Damage to these cables could prevent operation of the Train B containment coolers. Circuits associated with Train A containment coolers are run in a separate fire area and are unaffected by a fire in area C-30.

As discussed earlier, Train A ESW is available if a fire occurs in area C-30. Therefore, the Train A containment coolers will have the necessary service water flow to ensure proper operation.

References: E-15000, XX-E-013, E-13GN02A, E-1F9441, M-12GN01

5.2.31 Class 1E 4.16 kV ESF Switchgear Bus NB01 and NB02

Bus NB02 supplies power to Train B Engineered Safety Features (ESF) components. A fire in area C-30 could damage cables associated with NB02 and disrupt power to all Train B ESF components.

Control cables associated with bus NB02 Synchro-scope and associated switches are run in area C-30. Damage to these cables could prevent some of the monitoring functions for NB02 but would not cause a loss of the NB02 bus.

Redundant Train A ESF components, supplied by NB01, are unaffected by a fire in area C-30. Therefore, loss of power to Train B components due to a fire in area C-30 will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-13NB04, E-13NB05, E-13NB06, E-13NB14, E-13NB15, E-1F9423, E-1F9426, KD-7496

5.2.32 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

Cables 14NFK01CA and 14NFK01DA for one of the four UV relays on each bus are run in fire area C-30. Also, cables 14NFY01EA and 14NFY01FA associated with one of the four degraded voltage PTs on each bus are run in fire area C-30. Cables associated with the remaining three UV relays and PTs do not run in fire area C-30. Therefore, automatic functioning of the bus NB01 and NB02 emergency load shedder / sequencer is unaffected by a fire in area C-30 and a spurious start of the associated diesel generator due to a false undervoltage condition on two of the four circuits is not credible.

Cable 14NFK01AA is a DC power cable that runs from NK5412 to NF039C. Damage to this cable could prevent an auto start of the Train B emergency diesel generator upon degraded voltage on 2/4 Train B undervoltage relays or 2/4 input of Train B degraded voltage PTs.

Separation group 4 power cables 14NFY01GA and 14NFY01HA associated with NF039A, NF039B and NF039C are run in this area. Separation groups 1, 2 and 3 power cables associated with these panels are unaffected. Therefore, power to the load shedder/sequencer panels is available.

Based on the above discussion, the Train B emergency diesel generator may not be available if a fire occurs in this area but the Train A load shedder/sequencer is unaffected. In addition, off-site power to Train A components is unaffected based on Calculation XX-E-013, Appendix 2.

References: XX-E-013, E-15000, E-11NB01, E-11NB02, E-12NF01, E-13NF01, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, E-1F9402A, E-1F9402B, E-1F9403, E-1F9425, E-1F9426

5.2.33 Train B 480 Volt Class 1E Load Centers

Cables associated with Train B 480 VAC Class 1E load centers NG02, NG04 and motor control center (MCC) NG06E are run in area C-30. In addition, as stated in other sections, loss of power to these load centers could occur due to loss of Train B off-site and on-site power. Therefore, Train B load centers and associated equipment may not be available if a fire occurs in this area.

Cable 14PKK11AA is associated with 480 VAC breaker NG0409. NG0409 supplies 480 VAC power to Train B 125 VDC battery charger PK22, which energizes the PK02 bus. Damage to this cable could disable power to the battery charger but will not de-energize PK02 due to the installed batteries. Battery set PK12 will maintain 125 VDC power to PK02. In addition, NG0102 is unaffected and will continue to supply power to Train A 125 VDC battery charger PK21.

Redundant Train A components, supplied by NG01, NG03 and NG05E are unaffected by a fire in area C-30. Therefore, loss of power to Train B 480 VAC Class 1E load centers NG02, NG04 and MCC NG06E will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11NG02, E-13NG01A, E-13NG10A, E-13NG11A, E-13NG11B, E-13PK11, E-K3NG10A, E-1F9411B, E-1F9412B, E-1F9422C, E-1F9423, E-1F9424A. E-1F9424B, E-1F9424C, E-1F9424D

5.2.34 Class 1E 125 VDC Distribution System

Power cables associated with the Class 1E 125 VDC electrical distribution system are run in area C-30. These cables supply 125 VDC power to various PFSSD loads. The cables and supplied PFSSD equipment are summarized in the following table.

CABLE	NK BREAKER	CONTROL PANEL	PFSSD Components
14RLK01AA	NK04407	RL001/002	BGHV8153B, BGHV8154B
14RLK01BA	NK04409	RL005/006	FCFY0310
14RLK01CA	NK04412	RL017/018	EMHV8843, EMHV8871
14RLK01DA	NK04413	RL019/020	EGTV0030, GMHZ0019
14RLK01EA	NK04414	RL021/022	BBHV8001B, BBHV8002B

CABLE	NK BREAKER	CONTROL PANEL	PFSSD Components
14RLK01FA	NK04411	RL023/024	BMHV0001, BMHV0002, BMHV0003, BMHV0004

Damage to these cables could cause a loss of power to the associated components. This is acceptable for PFSSD since the components fail in the desired PFSSD position upon loss of power, or the redundant Train A component is available to perform the PFSSD function.

References: XX-E-013, E-15000, E-13BB30, E-13BG48, E-13BM06A, E-13EG16, E-13EM04, E-13EM04A, E-13FC21, E-13GM04A, E-13RL01, E-13RL02, E-13RL03, E-13RL04, E-13RL05, E-13RL06, E-13RL07, E-1F9101, E-1F9202, E-1F9301, E-1F9302, E-1F9401A, E-1F9422B, E-1F9444, M-12BB04, M-12BG01, M-12BM01, M-12EG02, M-12EM01, M-12EM02, M-12FC02, M-12GM01

5.2.35 BOP Instrument Racks

BOP instrument racks RP053A, RP053B, RP053D and RP147 are credited in the PFSSD analysis. The following table identifies the PFSSD components served by each instrument rack.

Instrument Rack	PFSSD Components
RP053A (RP053AA, RP053AB, RP053AC)	ALHV0009, ALHV0011 ALPY0037A, EGFT0128, EGPSL0077, GDTSL0001, JELSL0001C
RP053B (RP053BA, RP053BB, RP053BC)	ALHV0007, ALPY0039A, EGFT0129, EGPSL0078, GDTSL0011, JELSL0021C
RP053D (RP053DA, RP053DB)	ALPY0038A
RP147 (RP147A, RP147B)	ALHV0005

Cables 14RPY09BA and 14RPY09CA supply 120 VAC power to BOP instrument rack RP053B. Damage to these cables could cause a loss of function of panel RP053B and associated PFSSD components. Redundant components are supplied by the remaining BOP instrument racks.

Instrument racks RP053A, RP053D and RP147 are unaffected by the fire. Therefore, loss of PFSSD components associated with RP053B will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13AL08, E-13AL09, E-13EG13, E-13JE01, E-13NN01, E-13RP09, E-1F9101, E-1F9202, E-1F9204, E-1F9401B, E-1F9411B, E-1F9411A, E-1F9424D, E-1F9443, E-K3GD01A, E-K3GD04, M-12AL01, M-12EG01, M-12JE01, M-K2GD01

5.2.36 Control Room Lockout Relays

Cables associated with control room lockout relays 86XRP5, 86XRP6 and 86XRP7 are run in area C-30. Equipment controlled by the relays is identified in the table below.

Panel RP335 PFSSD Relays	
Relay #	**Description**
86XRP5	Train B MDAFP from CST and ESW Supply Valves (ALHV0034 and ALHV0030)
86XRP6	ESW to TDAFP Supply Valve (ALHV0033)
86XRP7	Train B MDAFP (PAL01B)

Damage to these cables could prevent operation of associated equipment. Train A equipment, located in a separate fire area, is available and is unaffected by the fire.

References: XX-E-013, E-15000, E-13AL01B, E-13AL02B, E-13AL04B, E-13RP12, E-13RP14, E-13RP15, E-093-00095, E-093-00096, E-1F9202, E-1F9204

5.2.37 Reactor Protection System

The Reactor Protection System (RPS) monitors specified input parameters and initiates reactor protection features whenever those parameters are outside specified limits. Field installed transmitters continuously monitor various parameters and report the results to one of four process cabinets, one per channel. Signals are then sent from the process cabinets to both solid state protection cabinets, one on each train. The cabinets and associated channel are listed in the following table:

Process Cabinets	Solid State Protection Cabinets
Cabinet SB038 - Channel 1 Cabinet SB042 - Channel 2 Cabinet SB037 - Channel 3 Cabinet SB041 - Channel 4	Cabinet SB029A - Train A Input Cabinet Cabinet SB029B - Train A Logic Cabinet Cabinet SB029C - Train A Output Cabinet 1 Cabinet SB029D - Train A Output Cabinet 2 Cabinet SB032A - Train B Input Cabinet Cabinet SB032B - Train B Logic Cabinet Cabinet SB032C - Train B Output Cabinet 1 Cabinet SB032D - Train B Output Cabinet 2

The RPS is actuated upon 2/3 or 2/4 coincident logic, depending on the input parameter. This ensures that a loss of a single channel will not prevent the system from performing its function. Loss of power to a single cabinet will render the channel or Train inoperative.

Cables associated with RPS channel 4 run through this area. These cables supply power from separation group 4 power supplies to panels SB029A, SB032A, SB032D and SB041. Power cables associated with RPS channels 1, 2 and 3 are run in a separate fire area.

Based on the above discussion, the reactor protection system is available if a fire occurs in this area.

References: XX-E-013, E-15000, E-11NK02, E-13NN01, E-13SB01, E-13SB02, E-13SB05, E-13SB08A, E-13SB08D, E-13SB09, E-1F9102, E-1F9103, E-1F9203, E-1F9205, E-1F9421, E-1F9433, E-1F9431, E-1F9432, M-761-000167

5.2.38 Reactor Trip Switchgear

The reactor trip switchgear is required to ensure the ability to manually trip the reactor. The reactor is tripped using either hand switch SBHS0001 or SBHS0042 in the main control room. Each hand switch has contacts associated with Train A reactor trip switchgear SB102A and Train B reactor trip switchgear SB102B.

Cable 14SBS12BC, associated with separation group 4 trip circuits, is run in area C-30. A hot short in this cable could cause a spurious reactor trip, which is the desired PFSSD condition. An open circuit will prevent a manual reactor trip on Train B reactor trip switchgear SB102B.

Cables associated with separation group 1 trip circuits are unaffected by a fire in area C-30. Therefore, operation of either hand switch SBHS0001 or SBHS0042 will cause a reactor trip on redundant Train A reactor trip switchgear SB102A.

References: XX-E-013, E-15000, E-13SB12A, E-1F9101

5.2.39 Process Monitoring Instrumentation

Circuits for a number of process instruments are run in area C-30. These circuits run from various process monitoring panels to the auxiliary shutdown panel (ASP) and provide indication at the ASP for control outside the control room.

Damage to these cables will not cause a loss of process monitoring capability in the main control room. Therefore, damage to these cables due to a fire in area C-30 will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13SB16, E-1F9201, E-1F9301, M-12BB01, M-12BB02, M-12BB04

5.2.40 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B.

Cable 14SES07BA is a power cable associated with SR monitor signal processor SENY0061B. Cable 14SES07CA is a power cable associated with SR monitor amplifier SENY0061A. Damage to these cables could prevent operation of the associated source range monitor.

Cable 14SES07BC is an instrumentation cable associated with SR monitor signal processor SENY0061B. This cable runs from SENY0061B to the source range recorder on RL020. Damage to this cable could prevent operation of the recorder. Source Range monitoring remains available for a fire in area C-30 using SENE0031, SENE0032 and SENY0060A/B.

For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013, Attachment 3.

References: E-15000, XX-E-013, E-13SE07, E-1F9101

5.2.41 RCS Hot and Cold Leg Temperature Indication

PFSSD requires RCS hot and cold leg temperature indication on at least one loop to verify flow through the steam generators. The temperature elements and control room indicators used for this purpose are listed in the following table.

RCS Hot and Cold Leg Temperature Elements/Indicators Used for PFSSD		
ELEMENT	**INDICATOR**	**FUNCTION**
BBTE0413A	BBTI0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	BBTI0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	BBTR0423	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	BBTI0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	BBTR0433	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	BBTR0433	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	BBTR0443	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	BBTR0433	RCS Cold Leg Temperature Element (WR) Loop 4

Cable 16RLY01EA supplies 120 VAC power to control room panel RL021/RL022. At RL021/RL022, the power is split and supplies power to BBTR0433 and BBTR0443, as well as other non-PFSSD components. Damage to this cable could disrupt power to BBTR0433 and BBTR0443. Consequently, loops 3 and 4 RCS temperature indication could be lost. However, RCS temperature indication on loops 1 and 2 remains available. Therefore, the PFSSD function is satisfied.

References: E-15000, XX-E-013, E-13BB15, E-13RL01, E-13RL06, E-1F9201, E-1F9421, M-12BB01

5.2.42 Load Center PG20 Incoming Feeder Breaker PG2001

Load center feeder breaker PG2001 is credited for PFSSD because it supplies power to credited non-safety related loads. Cable 16PGG13DA, associated with PG2001, runs in this area. Damage to this cable will trip the breaker.

Breaker PG2001 supplies power to the following PFSSD components:

- PG20GBR217 – MCB Misc. Power Circuits RL023
- PG20GER5 – Instr. Bus Transformer Alt. Feed XPN08D

PFSSD components powered from PG20GBR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG20GER5 is credited as one source of power to PN08. The redundant source of power from NG02BBF1 could also be affected by a fire in this area as discussed in Section 5.2.33. Redundant components powered from inverter PN07 are unaffected by a fire in this area.

Based on the above discussion, loss of breaker PG2001 will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-11PK02, E-13PG10, E-13PG11, E-13PG13, E-13RL07, E-1F9421, E-1F9422C, E-1F9424E, KD-7496

5.2.43 Normal Pressurizer Spray

The normal pressurizer spray valves are included in the PFSSD design because spurious operation of pressurizer sprays can cause a decrease in pressure which can lead to boiling in the core. The pressurizer spray valves are part of the pressurizer pressure control system.

The pressurizer normal spray valves (BBPCV0455B and BBPCV0455C) operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

An instrument cable (14BBI16NB) associated with pressurizer pressure transmitter BBPT0458 is run in fire area C-30. Damage to this cable could send a spurious high-pressure signal to the pressure control system. However, as discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure channel will not cause the spurious operation of the pressurizer spray valves due to the Ovation 4-channel validation logic, which uses the 2nd highest signal as the validated signal and has built-in logic to detect and ignore a failed input.

Based on the above discussion, the pressurizer spray valves will not spuriously open if a fire occurs in this area.

References: E-15000, XX-E-013, E-13BB19, M-744-00028, DCP 13324

5.2.44 120 VAC Distribution Panel PN410

120 VAC distribution panel PN410 supplies power to NSSS control panels RP043 and RP047.

Inverter PN04 supplies power to 120 VAC distribution panel PN410 (via cables 16PNY02AA and 16PNY02AB), which in turn supplies redundant 120 VAC power to NSSS control cabinets RP043 and RP047. For PFSSD, cabinet RP043 houses relays BGLCV0459X and BGLCV0460X, which are associated with letdown isolation valves BGLCV0459 and BGLCV0460, respectively. Cabinet RP047 includes controls for pressurizer PORVs and pressurizer spray.

Damage to cables 16PNY02AA and/or 16PNY02AB will disrupt power to panel PN410. Redundant power to RP043 and RP047 is available from 120 VAC distribution panel PN310. Therefore, loss of power to PN410 will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-1F9421, DCP 13324

FIRE AREA C-31

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-31 is located on the 2047 elevation of the Control Building and includes the rooms listed in Table C-31-1.

Table C-31-1
Rooms Located in Fire Area C-31

ROOM #	DESCRIPTION
3618	North Electrical Chase - 2047 Elevation

Fire area C-31 is protected with an automatic wet-pipe sprinkler system and automatic fire detection. The area is separated from adjacent areas by minimum 3-hour fire resistant construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-31-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the potential fire impact on some of the more significant PFSSD equipment, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-31-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-31

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Steam generator A ARV control may be lost. Steam generator B, C and D ARVs are unaffected. Cooldown is assured using Aux Feedwater Pump B supplying steam generator D and the Turbine Driven Auxiliary Feedwater Pump supplying steam generators B, C and D. Train B MDAFP can be used to supply steam generator A if ABPV0001 spuriously opens.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. Train A MDAFP may be affected. Train B MDAFP is available to supply SGs A and D. Suction is available from the CST and Train B ESW. However, as stated in AB System above, steam generator A ARV control may be lost. The TDAFP is available to supply all four steam generators. However, suction may only be available from Train B ESW system and, as stated in AB System above, steam generator A ARV control may be lost.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
BB	Reactor Coolant System	R, M, H, P, S	RCP thermal barrier cooling could be affected due to spurious closure of BBHV0013, BBHV0014, BBHV0015 and BBHV0016.
BG	Chemical and Volume Control System	R, M, S	Train A centrifugal charging pump (CCP) may not be available due to potential loss of CCW to the oil cooler. The Train B CCP is available to provide inventory control and boration through the reactor coolant pump (RCP) seals and boron injection tank (BIT) if necessary.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
BN	Borated Refueling Water Storage System	R, M, H	RWST level indicator BNLI0930 could be affected. RWST level indication is available using BNLI0931, BNLI0932 and BNLI0933.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.

Table C-31-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-31

System	System Name	PFSSD Function*	Comments
EG	Component Cooling Water System	S	All PFSSD functions associated with the component cooling water system are satisfied. A number of Train A CCW system components could be affected. The Train B CCW system is unaffected. CCW flow to the RCP thermal barriers could be affected as discussed in BB System comments above. CCW flow indicators EGFI0128 and EGFI0129 are unaffected. Valve EGHV0101 could spuriously open or may not open when operating Train A RHR. Valve EGHV0102 is unaffected.
EJ	Residual Heat Removal System	M, H, P	All PFSSD functions associated with the residual heat removal system are satisfied. Train A RHR may not be available due to the inability to control valve EJHV8804A. Train B RHR is unaffected.
EM	High Pressure Coolant Injection	R, M	BIT outlet valve EMHV8801A may be affected, but valve EMHV8801B is available to ensure an available BIT flowpath using Train B CCP.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
GK	Control Room and Class 1E Switchgear Room Coolers	S	Train A control room A/C unit SGK04A may be affected. Train B control room A/C unit SGK04B is unaffected.
GL	Auxiliary Building HVAC	S	Train A CCW pump room cooler SGL11A could be affected. Train B CCW pump room cooler SGL11B is unaffected.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.

Table C-31-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-31

System	System Name	PFSSD Function*	Comments
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
NG	480V Load Centers and MCCs	S	Train A 480 V MCC NG03C could be affected. Redundant Train B 480 V MCCs are unaffected.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.

Table C-31-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-31

System	System Name	PFSSD Function*	Comments
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
QD	Emergency Lighting	S	The 125 VDC emergency lights in the control room could be affected. Self-contained battery powered lighting units are available to provide lighting in the control room.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-31.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-31. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs

It may be necessary to fail close ABPV0001 by isolating air and nitrogen to the valve using KAV1435 (air) and KAV1364 (Nitrogen) then venting air from the regulator. These valves are located in area A-23 and emergency lighting is available. Per calculation WCNOC-CP-002, this action is not required to ensure safe shutdown.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Auxiliary Feedwater

If steam generator A ARV ABPV0001 control is lost, use the Turbine Driven Auxiliary Feedwater Pump to supply steam generators B, C and/or D and control steam release using ARVs ABPV0002, ABPV0003 and/or ABPV0004.

3.2.2 Component Cooling Water

Train A CCW could be affected by a fire in this area. If this occurs, swap to Train B CCW using normal operating procedures if Train B CCW is not already running.

3.2.3 Reactor Coolant Pump Seal Cooling

Thermal barrier cooling could be affected. RCP seal injection could temporarily be disrupted until the Train B CCP is lined up. The Train B CCP can be started and lined up from the control room.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

With some exceptions, redundant Post Fire Safe Shutdown capability exists from the main control room if a severe fire occurs in area C-31. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-31.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-31

PFSSD components (S. in E-15000) located in area C-31 are shown in Table C-31-3. An evaluation of each component is provided in the sections that follow. The applicable evaluation section is listed in Table C-31-3.

Table C-31-3 PFSSD Equipment Located in Fire Area C-31				
Room #	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
3618	TB36111	Terminal Box Valve EMHV8801A Control Circuit	5.2.9	

5.2 PFSSD CABLE EVALUATION

Table C-31-4 lists all the PFSSD cables (S. in E-15000) located in fire area C-31. The applicable evaluation section is also listed in Table C-31-4.

Table C-31-4
PFSSD Cables Located in Fire Area C-31

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11ABI20EE	3618	ABPY0001	I	5.2.1	SG A ARV ABPV0001 I/P Converter
11ALG02BA	3618	ALHV0035	P	5.2.2	CST to MDAFP A Suction
11ALG02BB	3618	ALHV0035	C	5.2.2	CST to MDAFP A Suction
11ALG02BC	3618	ALHV0035	C	5.2.2	CST to MDAFP A Suction
11ALG02CA	3618	ALHV0036	P	5.2.2	CST to TDAFP Suction
11ALG02CB	3618	ALHV0036	C	5.2.2	CST to TDAFP Suction
11ALG02CC	3618	ALHV0036	C	5.2.2	CST to TDAFP Suction
11ALG04BA	3618	ALHV0031	P	5.2.2	ESW to MDAFP A Suction
11ALG04BB	3618	ALHV0031	C	5.2.2	ESW to MDAFP A Suction
11ALG04BC	3618	ALHV0031	C	5.2.2	ESW to MDAFP A Suction
11ALG04BD	3618	ALHV0031	C	5.2.2	ESW to MDAFP A Suction
11ALG04BE	3618	ALHV0031	C	5.2.2	ESW to MDAFP A Suction
11ALG04CA	3618	ALHV0032	P	5.2.2	ESW A to TDAFP Suction
11ALG04CB	3618	ALHV0032	C	5.2.2	ESW A to TDAFP Suction
11ALG04CC	3618	ALHV0032	C	5.2.2	ESW A to TDAFP Suction
11ALG04CD	3618	ALHV0032	C	5.2.2	ESW A to TDAFP Suction
11ALG04CE	3618	ALHV0032	C	5.2.2	ESW A to TDAFP Suction
11BBG03AA	3618	BBHV0013	P	5.2.4	RCP A Thermal Barrier Return Iso Valve
11BBG03AB	3618	BBHV0013	C	5.2.4	RCP A Thermal Barrier Return Iso Valve
11BBG03AC	3618	BBHV0013	C	5.2.4	RCP A Thermal Barrier Return Iso Valve
11BBG03AD	3618	BBHV0013	C	5.2.4	RCP A Thermal Barrier Return Iso Valve
11BBG03BA	3618	BBHV0014	P	5.2.4	RCP B Thermal Barrier Return Iso Valve

Table C-31-4
PFSSD Cables Located in Fire Area C-31

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BBG03BB	3618	BBHV0014	C	5.2.4	RCP B Thermal Barrier Return Iso Valve
11BBG03BC	3618	BBHV0014	C	5.2.4	RCP B Thermal Barrier Return Iso Valve
11BBG03BD	3618	BBHV0014	C	5.2.4	RCP B Thermal Barrier Return Iso Valve
11BBG03CA	3618	BBHV0015	P	5.2.4	RCP C Thermal Barrier Return Iso Valve
11BBG03CB	3618	BBHV0015	C	5.2.4	RCP C Thermal Barrier Return Iso Valve
11BBG03CC	3618	BBHV0015	C	5.2.4	RCP C Thermal Barrier Return Iso Valve
11BBG03CD	3618	BBHV0015	C	5.2.4	RCP C Thermal Barrier Return Iso Valve
11BBG03DA	3618	BBHV0016	P	5.2.4	RCP D Thermal Barrier Return Iso Valve
11BBG03DB	3618	BBHV0016	C	5.2.4	RCP D Thermal Barrier Return Iso Valve
11BBG03DC	3618	BBHV0016	C	5.2.4	RCP D Thermal Barrier Return Iso Valve
11BBG03DD	3618	BBHV0016	C	5.2.4	RCP D Thermal Barrier Return Iso Valve
11BNI07CA	3618	BNLT0930	I	5.2.3	RWST Level Transmitter
11EFG04AA	3618	EFHV0059	P	5.2.4	Train A CCW Return to ESW UHS
11EFG04AB	3618	EFHV0059	C	5.2.4	Train A CCW Return to ESW UHS
11EFG04AC	3618	EFHV0059	C	5.2.4	Train A CCW Return to ESW UHS
11EFG05AC	3618	EFHV0051	C	5.2.4	ESW A to CCW HX A
11EGG05AA	3618	EGHV0015	P	5.2.4	CCW A Pump Common Header Return Iso Vlv
11EGG05AB	3618	EGHV0015	C	5.2.4	CCW A Pump Common Header Return Iso Vlv
11EGG05AC	3618	EGHV0015	C	5.2.4	CCW A Pump Common Header Return Iso Vlv
11EGG05CA	3618	EGHV0053	P	5.2.4	A Train CCW Supply To Nuclear Aux Comp.
11EGG05CB	3618	EGHV0053	C	5.2.4	A Train CCW Supply To Nuclear Aux Comp.
11EGG05CC	3618	EGHV0053	C	5.2.4	A Train CCW Supply To Nuclear Aux Comp.

Table C-31-4
PFSSD Cables Located in Fire Area C-31

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EGG05CD	3618	EGHV0053	C	5.2.4	A Train CCW Supply To Nuclear Aux Comp.
11EGG07AA	3618	EGHV0101	P	5.2.5	CCW A to RHR A Heat Exchanger
11EGG07AB	3618	EGHV0101	C	5.2.5	CCW A to RHR A Heat Exchanger
11EGG07AC	3618	EGHV0101	C	5.2.5	CCW A to RHR A Heat Exchanger
11EGG09DA	3618	EGHV0061	P	5.2.4	CCW Return From RCS Iso Valve
11EGG09DB	3618	EGHV0061	C	5.2.4	CCW Return From RCS Iso Valve
11EGG09DC	3618	EGHV0061	C	5.2.4	CCW Return From RCS Iso Valve
11EGG09DD	3618	EGHV0061	C	5.2.4	CCW Return From RCS Iso Valve
11EGI13AA	3618	EGPT0077	I	5.2.4	CCW Pumps A & C Discharge Pressure
11EJG04AA	3618	EJHV8804A	P	5.2.5	RHR A to CVCS CCP Iso Valve
11EJG04AB	3618	EJHV8804A	C	5.2.5	RHR A to CVCS CCP Iso Valve
11EJG04AC	3618	EJHV8804A	C	5.2.5	RHR A to CVCS CCP Iso Valve
11EMG02CF	3618	EMHV8801A	C	5.2.9	Train A BIT Outlet Valve
11EMG02CG	3618	EMHV8801A	C	5.2.9	Train A BIT Outlet Valve
11GKG02AA	3618	GK198C	P	5.2.6	Control Room A/C Unit SGK04A Pwr/Ctrl Pnl
11GKG02AB	3618	GK198C	C	5.2.6	Control Room A/C Unit SGK04A Pwr/Ctrl Pnl
11GKY02AB	3618	GKHZ0029B	C	5.2.6	Control Room A/C Unit 4A Return Damper
11GKY02AC	3618	GKHZ0029A	C	5.2.6	Control Room A/C Unit 4A Supply Damper
11GKY02AD	3618	GKHZ0029A/B	C	5.2.6	Control Room A/C Unit 4A Return and Supply Dampers
11GKY02AE	3618	GKHZ0029A/B	C	5.2.6	Control Room A/C Unit 4A Return and Supply Dampers
11GLG06AD	3618	DSGL11A	C	5.2.4	Train A CCW Pump Room Cooler Motor

Table C-31-4 PFSSD Cables Located in Fire Area C-31					
Cable #	**Location**	**Primary PFSSD Equipment**	**Cable Function** (P) Power (C) Control (I) Instrumentation	**Evaluation Section**	**Comments**
11NGG01BB	3618	NG003CAF1	P	5.2.7	NG03C Incoming Power Feed from NG0306
11NGG01BC	3618	NG003CAF1	P	5.2.7	NG03C Incoming Power Feed from NG0306
11QDK01AA	3618	QD01, QD02, QD03, QD04, QD05, QD06	P	5.2.8	Control Room Emergency Lights
11SAZ19EA	3618	GKHZ0029A/B	C	5.2.6	SGK04A Supply/Return Dampers Status Panel Input
11SAZ19JA	3618	SGK04A	C	5.2.6	Status Panel SA066A Input from SGK04A

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

5.2.1 Steam Generator Atmospheric Relief Valves

PFSSD requires at least two steam generator atmospheric relief valves (ARV) be controlled and the other two closed. The ARVs are pneumatically operated using air from the compressed air system (KA) or nitrogen from the nitrogen accumulators. The valves open by pneumatic pressure and close by spring action. A pressure transmitter installed on the outlet side of the steam generator sends a signal to a controller and automatically controls the associated ARV position. Alternatively, each ARV can be controlled manually from the control room or the auxiliary shutdown panel by placing the pressure indicating controller (PIC) in manual.

Cable 11ABI20EE is associated with steam generator A ARV ABPV0001 I/P converter. Damage to this cable could prevent controlling the ARV from the main control room. If necessary, ABPV0001 can be failed closed by isolating air and nitrogen to the valve using KAV1435 (air) and KAV1364 (Nitrogen) then venting air from the regulator. These valves are located in area A-23 and emergency lighting is available.

Steam generator ARVs ABPV0002, ABPV0003 and ABPV0004 are unaffected by a fire in this area and remain available to control steam release through steam generators B, C and D.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

Based on the above discussion, ARV ABPV0001 could fail in the open or closed position but no action is necessary to mitigate the failed ARV. If operators want to close the ARV, it can be failed closed by isolating air and nitrogen to the valve using KAV1435 (air) and KAV1364 (Nitrogen) then venting air from the regulator.

References: E-15000, XX-E-013, E-13AB20A, E-13AB20B, E-1F9101, J-110-00216, J-110-00217, M-12AB01, M-12KA04, M-12KA05, Calculation WCNOC-CP-002

5.2.2 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire auxiliary feedwater (AFW) demand to achieve cold shutdown.

The suction isolation valve from the condensate storage tank (CST) to the Train A MDAFP (ALHV0035) may be affected, causing the valve to spuriously close. In addition, the essential service water (ESW) source to Train A MDAFP may be affected due to damage to cables associated with ALHV0031. Therefore, the Train A MDAFP may not be available.

The suction isolation valve from the condensate storage tank (CST) to the TDAFP (ALHV0036) may be affected, causing the valve to spuriously close. In addition, the Train A ESW source to the TDAFP may be affected due to damage to cables associated with ALHV0032. The Train B ESW supply to the TDAFP remains available since valve ALHV0033 is unaffected.

As discussed in Section 5.2.1, steam generator A ARV ABPV0001 control could be lost. Therefore, it may be necessary to cool down using steam generators B, C and/or D.

Auxiliary feedwater is assured using Train B MDAFP supplying steam generators A and D and the TDAFP supplying steam generators A, B, C and D, although steam generator A ARV control may be affected.

References: E-15000, XX-E-013, E-13AL02A, E-13AL02B, E-13AL04A, E-13AL04B, E-1F9202, E-1F9204, M-12AB02, M-12AL01, M-00AL

5.2.3 Refueling Water Storage Tank Level Indication

The RWST is credited in the PFSSD analysis as the primary source of borated water to achieve cold shutdown. The Wolf Creek Technical Specifications ensure the minimum quantity and boron concentration is maintained to achieve cold shutdown. Therefore, RWST level transmitters, indicators and circuits are not evaluated for level control.

The RWST level transmitters and associated circuits are included in the PFSSD analysis because of the automatic functions they perform. The function of the four level transmitters is to monitor RWST level and send a signal to ESFAS upon low level sensed by 2 out of 4 level transmitters. A low level signal on 2 out of 4 RWST level transmitters, coincident with a safety injection signal, will initiate a swapover of the RHR suction source from RWST to the containment sump. A spurious swapover will not adversely affect PFSSD, but if the fire prevents valves BNHV8812A and/or BNHV8812B from reaching their full closed position, the RWST will drain to the containment sump.

An instrument cable for refueling water storage tank (RWST) level transmitter BNLT0930 runs through fire area C-31. Cables for the remaining three RWST level transmitters are unaffected. In addition, a fire in area C-31 will not cause a spurious safety injection signal.

Based on the above discussion, a fire in area C-31 will not cause the RWST to drain to the containment sump.

References: E-15000, XX-E-013, E-13BN03, E-13BN03A, E-13BN07, E-1F9205, M-10BN, M-12BN01, M-12EJ01

5.2.4 Component Cooling Water

For PFSSD, the component cooling water (CCW) system is used to provide cooling to the centrifugal charging pump (CCP) oil cooler, the seal water heat exchanger, the RHR heat exchanger and the RHR pump seal cooler. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Valves EFHV0051 and EFHV0059 control ESW flow to the Train A CCW heat exchanger. Valve EFHV0051 is required to be open and valve EFHV0059 is required to remain closed for PFSSD. Damage to cables associated with these valves could cause spurious operation of the valves and prevent proper ESW water flow to the Train A CCW heat exchanger. Train B ESW to Train B CCW heat exchanger water flow is unaffected by a fire in area C-31.

Cables associated with valves EGHV0015, EGHV0053 and EGHV0061 are run in area C-31. Damage to these cables could cause spurious operation of the valves. Spurious closure of EGHV0015 and/or EGHV0053 will prevent water flow to/from Train A CCW to the seal water heat exchanger and RCP thermal barriers, as well as a number of non-PFSSD components. Spurious closure of EGHV0061 will prevent Train A and Train B CCW flow to/from the RCP thermal barriers.

Power and control cables associated with valves BBHV0013, BBHV0014, BBHV0015 and BBHV0016 could be affected by a fire in this area. Cable damage could cause the valves to spuriously close. If this occurs, CCW flow to the RCP thermal barriers would be lost. In

addition, if valve EGHV0061 were to spuriously close, CCW flow to the RCP thermal barriers would be lost.

Spurious operation of BBHV0013, BBHV0014, BBHV0015, BBHV0016, EGHV0015, EGHV0053 and EGHV0061 will not adversely impact PFSSD. Train B CCW is unaffected by a fire in this area. If valve EGHV0061 closes, RCP seal injection remains available from the B Train CCP to protect the RCP seals. Loss of thermal barrier cooling would be indicated in the control room as a reduction in flow on flow indicators EGFI0128 and EGFI0129. Therefore, operators can diagnose a loss of thermal barrier cooling.

Pressure transmitter EGPT0077 monitors Train A CCW pump discharge and provides a signal to start the second Train A CCW pump if discharge header pressure is low. The pressure transmitter also provides annunciation in the main control room. Damage to the cable associated with this transmitter could provide false pressure annunciation and prevent operation of the automatic swap feature. Train B CCW pressure transmitter EGPT0078 is unaffected by a fire in area C-31.

A control cable associated with Train A CCW pump room cooler motor DSGL11A is run in area C-31. Damage to this cable could prevent operation of the room cooler. Cables associated with Train B CCW room cooler SGL11B are not run in area C-31. Therefore, the Train B CCW room cooler is available.

Based on the above discussion, the Train B CCW system is unaffected by a fire in this area and can be used to supply cooling water to associated Train B equipment.

References: E-15000, XX-E-013, E-13BB03, E-13BB28, E-13EF04, E-13EG01A, E-13EG01B, E-13EG05A, E-13EG05B, E-13EG09A, E-13EG13, E-13GL06, E-1F9401A, J-02EG01A, J-02EG01B, J-02EG01C, J-110-00211, M-12EF02, M-12EG01, M-12EG02, M-12EG03

5.2.5 Residual Heat Removal System

PFSSD requires one train of residual heat removal (RHR) to be available for shutdown cooling. The RHR system is not used for hot standby.

Cables 11EJG04AA, 11EJG04AB and 11EJG04AC are power and control cables associated with normally closed valve EJHV8804A. This valve is required to remain closed when aligning Train A RHR for cold shutdown. For hot standby, the valve can be in any position. Damage to these cables could cause the valve to open, which would cause flow diversion from Train A RHR to the charging pump suction header. Train B valve EJHV8804B is unaffected by a fire in area C-31.

Valve EGHV0101 is the Train A CCW to RHR Heat Exchanger control valve. Valve EGHV0102 is the Train B CCW to RHR Heat Exchanger control valve. These valves are normally closed during power operation. PFSSD requires that the valve on the operating train of CCW be closed until shutdown cooling mode is entered, at which time the valve on the operating train of RHR needs to be open. As stated in Section 5.2.2, the Train A CCW system may not be available to supply cooling water to the Train A RHR heat exchanger. Cables 11EGG07AA, 11EGG07AB and 11EGG07AC are associated with valve EGHV0101. Damage to the cables could prevent operation of EGHV0101 and damage to cable 11EGG07AC could cause the valve to spuriously open. Valve EGHV0102 is unaffected by a fire in this area.

The Train B CCW system is available to supply cooling water to the Train B RHR heat exchanger. Cables associated with valves EGHV0102 and EJHV8804B are not run in area C-31. Therefore, the Train B RHR system is available to provide decay heat removal if a fire occurs in area C-31.

References: E-15000, XX-E-013, E-13EG07, E-13EJ04A, E-1F9205, M-12BG03, M-12EJ01

5.2.6 Control Room Air Conditioning

PFSSD requires control room air conditioning to be available. Cables associated with Train A control room A/C unit SGK04A are run in this area. In addition, cables associated with SGK04A supply and return dampers GKHZ0029B and GKHZ0029A, respectively, are run in this area. Damage to these cables could prevent operation of the unit.

Cable 11SAZ19EA provides status indication of SGK04A supply and return dampers GKHZ0029A and GKHZ0029B. Cable 11SAZ19JA provides status indication of Train A control room A/C unit SGK04A. Damage to these cables could prevent operation of the associated equipment.

Cables associated with Train B control room A/C unit SGK04B and associated dampers are run in a separate fire area. Therefore, the Train B control room A/C unit is unaffected by a fire in this area.

References: XX-E-013, E-15000, E-13GK02B, E-13GK02C, E-13SA19, E-1F9442, M-12GK01, M-622.1A-00007

5.2.7 Train A 480 VAC Load Centers

PFSSD requires 480 VAC power to energize necessary PFSSD equipment. Power cables that supply 480 VAC power from NG0306 to 480 VAC motor control center (MCC) NG03C incoming breaker NG03CAF1 are run in area C-31. Train A PFSSD equipment powered from NG03C is identified in the following table.

Train A 480 Volt MCC NG03C	
MCC Breaker	**Description**
NG03CCF3	Train A MDAFW Supply from ESW Valve ALHV0031
NG03CCF4	TDAFW Supply from ESW Valve ALHV0032
NG03CDF2	Train A CCW Pump Room Cooler DSGL11A
NG03CEF3	Train A MDAFW Pump from CST Valve ALHV0035
NG03CEF4	TDAFW Suction from CST Valve ALHV0036
NG03CGF4	Train A Control Room A/C Inlet Damper GKHZ29A
NG03CHF2	Train A ESW Return from Train A CCW Hx Valve EFHV0059
NG03CHF3	Train A CCW Return from Nuc Aux Comp Valve EGHV0015
NG03CJF1	Train A CCW to RHR Heat Exchanger Valve EGHV0101
NG03CJF3	Train A CCW to Nuclear Aux Components (EGHV0053)
NG03CKF3	CCW Return from RCP Thermal Barriers Valve EGHV0061
NG03CLF115	Train A CR A/C Dampers GKHZ0029A and GKHZ0029B
NG03CMF1	Train A ESW to CCW Hx Valve EFHV0051
NG03CMF4	Train A RHR to CCP Suction Valve EJHV8804A

Train B 480 VAC MCCs are unaffected by a fire in this area and are available to supply power to redundant Train B equipment. Therefore, a fire in area C-31 will not impact the ability to supply power to required Train B 480 VAC equipment.

References: XX-E-013, E-15000, E-1F9424C, E-11001, E-11NG01, E-11NG01A

5.2.8 Control Room Emergency Lights

Emergency lighting is provided in the control room to ensure adequate lighting during a station blackout or in the event a fire damages cables associated with the normal and standby lighting system. Emergency lights are supplied power from Class 1E 125 VDC breaker NK5120.

The control room has four sources of lighting; 1) Normal (QA); 2) Standby (QB); 3) Emergency (QD); and 4) Self-contained battery units (QD). The normal lighting system is not evaluated in the PFSSD analysis and is assumed lost. Cable 11QDK01AA is a 125 VDC power cable that runs from NK051A to the control room DC emergency lights. Damage to this cable will prevent operation of the DC emergency lights.

Self-contained Appendix R battery units are provided in the control room to provide minimum lighting for post-fire safe shutdown. Three units are provided in the front panel area, each with two light heads, to provide illumination on the main control boards. Two additional units are provided in the corridor area and two units are provided in the back panel area, each with two light heads. The Appendix R battery units are capable of providing minimum illumination for 8 hours, during which time action can be taken by maintenance to restore the normal or standby lighting system.

Based on the above discussion, sufficient lighting exists in the control room to achieve and maintain PFSSD.

References: E-15000, XX-E-013, E-093-00064, E-11NK01, E-13NG01A, E-13QB03, E-13QD01, E-1L3604, E-1L8900

5.2.9 Boron Injection Tank Flow Path Valves

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

Train A BIT outlet valve EMHV8801A may be affected by a fire in this area. Cable 11EMG02CF and 11EMG02CG associated with EMHV8801A, are run in this area. Cable 11EMG02CF is a fire resistive cable and will not be damaged by a fire. However, cable 11EMG02CG is not fire resistive and damage to this cable could prevent opening the valve and could prevent a flowpath from Train A CCP to the RCS via the BIT. Redundant Train B valve EMHV8801B is unaffected by a fire in this area so the Train B CCP flowpath to the RCS via the BIT is available.

Also, a fire in this area could cause valve EMHV8801A to open, creating a BIT Train A flowpath into the RCS, possibly overfilling the pressurizer. However, there are no SIS circuits in this area, with which a fire could cause a spurious SIS starting the CCP. Thus, even with the flowpath, a fire cannot produce the flow to cause overfill of the pressurizer. Additionally, neither EMHV8803A nor EMHV8803B, the Charging Pump Discharge Header To BIT Isolation Valves, are affected by a fire in this area. Therefore, a fire in this area will not create a flowpath from the CCPs to the RCS.

The SIS test line is required to be isolated when charging through the BIT to prevent inventory loss. Valve EMHV8871 is unaffected by the fire in this area and is available to ensure the SIS test line remains isolated.

A fire in area C-31 uses CCP B, since circuits and support systems for CCP B are unaffected by the fire in this area.

Based on the above discussion, charging through the BIT is unaffected by a fire in this area using Train B CCP and valves EMHV8801B and EMHV8803B. The SI test line can be isolated using valve EMHV8871.

References: E-15000, XX-E-013, E-13EM02, E-13EM02A, E-13EM02B, E-13EM02C, E-13EM05A, E-13EM12, E-13RL01, E-1F9302, M-13EM01, M-12EM02

FIRE AREA C-32

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-32 is located on the 2047 elevation of the Control Building and includes the room listed in Table C-32-1.

Table C-32-1
Rooms Located in Fire Area C-32

ROOM #	DESCRIPTION
C32	South Small Elec Chase 2047 Elevation

Fire area C-32 is protected with an automatic fire suppression and detection system. The area is bounded on all sides by minimum 3-hour fire rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-32-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-32-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-32

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	It may be necessary to isolate SG B ARV using local control station ABFHC0002. Steam generators A, C and D ARVs are unaffected. Steam line pressure transmitters ABPT0515, ABPT0525, ABPT0535, ABPT0545 may be affected. The remaining steam line pressure transmitters are unaffected. Valves ABHV0005 and ABHV0006 could be affected, preventing operation of the turbine driven auxiliary feedwater pump. Both motor driven auxiliary feedwater pumps are available.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
AE	Main Feedwater	H, P	Steam generator level transmitters AELT0519 (SG A NR), AELT0549 (SG D NR), AELT0552 (SG B NR) and AELT0553 (SG C NR) may be affected. The remaining level transmitters are unaffected.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. The turbine driven auxiliary feedwater pump (TDAFP) may not be available. The motor driven auxiliary feedwater pumps are unaffected.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
BB	Reactor Coolant System	R, M, H, P, S	RCS Temperature elements BBTE0413B and BBTE0433A, as well as associated temperature indicators, could be affected by a fire in this area. The remaining temperature elements/indicators are unaffected. Pressurizer pressure transmitter BBPT0456 may be affected. The remaining pressurizer pressure transmitters are unaffected. When transferring to RHR, valve BBPV8702A or BBPV8702B may need to be manually opened to provide a suction source from the RCS to RHR pump A or B. Pressurizer pressure indication is available using BBPI0455A, BBPI0457 or BBPI0458.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
BN	Borated Refueling Water Storage System	R, M, H	Level transmitter BNLT0931 may be affected. Level transmitters BNLT0930, BNLT0932 and BNLT0933 are available.

Table C-32-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-32

System	System Name	PFSSD Function*	Comments
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
EJ	Residual Heat Removal System	M, H, P	Both trains of RHR are available. However, as discussed in the BB system comments, it may be necessary to manually open BBPV8702A or BBPV8702B.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
FC	Auxiliary Turbines	R, H, P	The TDAFP speed control valve FCFV0313 and trip and throttle valve FCHV0312 could be affected. The motor driven auxiliary feedwater pumps are available.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.

Table C-32-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-32

System	System Name	PFSSD Function*	Comments
GN	Containment Coolers	S	Containment pressure transmitter GNPT0936 may be affected. The remaining containment pressure transmitters are unaffected.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
NF	Load Shed and Emergency Load Sequencing	S	All PFSSD functions associated with load shed/emergency load sequencing system are satisfied. Separation group 2 power supply cables for load shedder/sequencer logic and input cabinets NF039A and NF039B could be affected. Redundant AC power is available from separation groups 1, 3 and 4 power supplies.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.

Table C-32-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-32

System	System Name	PFSSD Function*	Comments
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
RP	Miscellaneous Control Panels	R, M, H, P, S	Power to lockout relays 86XRP1, 86XRP2 and 86XRP3 could be affected. This will not impact PFSSD.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
SB	Reactor Protection System	R, S	RPS Channel 2 could be affected. RPS Channels 1, 3 and 4 are unaffected.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
SE	Ex-Core Neutron Monitoring	R, P	Source range indicator SENI0032B could be affected. Source range indication remains available using SENI0031B, SENI0060A/B and SENI0061A/B.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-32.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-32. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs

If damage occurs to cables associated with ABPV0002, local control station ABFHC0002, located in room 1509, can be used to close ARV ABPV0002.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 Residual Heat Removal

It may be necessary to either perform a cold shutdown repair or manually open valve BBPV8702A or BBPV8702B when transitioning to RHR.

4.0 CONCLUSION

Redundant post-fire safe shutdown capability is unaffected by a fire in area C-32.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-32.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-32

There are no PFSSD components located in fire area C-32. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-32-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-32. The applicable evaluation section is also listed in Table C-32-3.

Table C-32-3
PFSSD Cables Located in Fire Area C-32

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12ABI20FJ	C32	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FL	C32	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FM	C32	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI20FN	C32	ABPV0002	I	5.2.1	Steam Generator B ARV
12ABI21KA	C32	ABPT0515	I	5.2.7	SG A Steam Pressure
12ABI21NA	C32	ABPT0525	I	5.2.7	SG B Steam Pressure
12ABI21SA	C32	ABPT0535	I	5.2.7	SG C Steam Pressure
12ABI21VA	C32	ABPT0545	I	5.2.7	SG D Steam Pressure
12ABK01AD	C32	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12ABK01AE	C32	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12ABK01AF	C32	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12ABK01AG	C32	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12ABK01BD	C32	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12ABK01BE	C32	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12ABK01BF	C32	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12ABK01BG	C32	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12AEI08EB	C32	AELT0519	I	5.2.3	SG A Narrow Range Water Level
12AEI08FB	C32	AELT0549	I	5.2.3	SG D Narrow Range Water Level
12AEI12BB	C32	AELT0552	I	5.2.3	SG B Narrow Range Water Level
12AEI12CB	C32	AELT0553	I	5.2.3	SG C Narrow Range Water Level
12ALI07KF	C32	ALPI0026A	I	5.2.1	TDAFP Suction Pressure Indicator at RL005
12ALI08BA	C32	ALPT0038	I	5.2.1	ESFAS Low Suction Pressure Transmitter
12BBI15EB	C32	BBTE0413B	I	5.2.3	RCS Cold Leg Temp Element (WR) Loop 1

Table C-32-3
PFSSD Cables Located in Fire Area C-32

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12BBI15KB	C32	BBTE0433A	I	5.2.3	RCS Hot Leg Temp Element (WR) Loop 3
12BBI15NB	C32	BBPT0403	I	5.2.4	RCS Pressure Wide Range
12BBI16LB	C32	BBPT0456	I	5.2.7 5.2.10	Pressurizer Pressure Transmitter
12BNI07DA	C32	BNLT0931	I	5.2.8	RWST Level Transmitter
12FCK23AA	C32	FCHV0312	C	5.2.1	TDAFP Trip and Throttle Valve
12FCK23AR	C32	FCHV0312	P	5.2.1	TDAFP Trip and Throttle Valve
12FCK23AS	C32	FCHV0312	C	5.2.1	TDAFP Trip and Throttle Valve
12FCK23AU	C32	FCHV0312	P	5.2.1	TDAFP Trip and Throttle Valve
12FCK24AL	C32	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12FCK24AM	C32	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12FCK24AN	C32	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12FCK24AP	C32	FCFV0313	I	5.2.1	TDAFP Speed-Governing Valve
12GNI05BA	C32	GNPT0936	I	5.2.7	Containment Pressure Transmitter
12NFK01CA	C32	NF039A	C	5.2.2	Load Shedder / Emergency Load Sequencer
12NFK01DA	C32	NF039B	C	5.2.2	Load Shedder / Emergency Load Sequencer
12NFY01CA	C32	NF039A	P	5.2.2	120 VAC Power to NF039A from NN0206
12NFY01DA	C32	NF039B	P	5.2.2	120 VAC Power to NF039B from NN0204
12NFY01EA	C32	NF039A	C	5.2.2	Load Shedder / Emergency Load Sequencer
12NFY01FA	C32	NF039B	C	5.2.2	Load Shedder / Emergency Load Sequencer
12RLK01AA	C32	RL005/RL006	P	5.2.1	Turbine Generator & Feedwater Control Panel
12RPK09BA	C32	RP334	P	5.2.9	Auxiliary Relay Rack
12RPK15AA	C32	FCHV0312	C	5.2.1	TDAFP Trip and Throttle Valve

Table C-32-3
PFSSD Cables Located in Fire Area C-32

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12RPK15BA	C32	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12RPK15CA	C32	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12RPY09AA	C32	RP053DA	P	5.2.1	120 VAC to BOP Instrumentation Rack from NN0208
12SAK21CA	C32	SA036C	P	5.2.1	125 VDC to ESFAS Channel 2 Term Cab from NK4205
12SAY21CA	C32	SA036C	P	5.2.1	120 VAC to ESFAS Channel 2 Term Cab from NN0205
12SAZ23AA	C32	ABHV0005	C	5.2.1	Main Steam Loop 2 to TDAFP
12SAZ23BA	C32	ABHV0006	C	5.2.1	Main Steam Loop 3 to TDAFP
12SBS01BD	C32	SB029A	P	5.2.5	120 VAC to SSPS A Input Panel from NN0210
12SBS02BD	C32	SB032A	P	5.2.5	120 VAC to SSPS B Input Panel from NN0209
12SBS16AA	C32	AELI0502A	I	5.2.3	Steam Generator B Wide Range Water Level
12SBS16BA	C32	BBTI0423X	I	5.2.3	RCS Cold Leg Loop 2 Temperature
12SBS16GA	C32	BBLI0460B	I	5.2.3	Pressurizer Level Narrow Range
12SBS16HA	C32	BBTI0443A	I	5.2.3	RCS Hot Leg Loop 4 Temperature
12SBY09DA	C32	SB042	P	5.2.5	120 VAC to Process Protection Set 2 Panel from NN0212
12SES02AA	C32	SE054B	P	5.2.6	120 VAC to Nuclear Instrument Panel from NN0211

5.2.1 Auxiliary Feedwater and Steam Generator Atmospheric Relief Valves

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. Atmospheric relief valves on the two steam generators being fed need to be controlled and atmospheric relief valves on the remaining two steam generators need to be closed. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire auxiliary feedwater (AFW) demand to achieve cold shutdown.

Cables associated with ABHV0005, ABHV0006, FCHV0312 and FCFV0313 are run in area C-32. Damage to these cables could either cause all four valves to spuriously open at the same time, causing uncontrolled blowdown through the TDAFP, or prevent operation of one or more valve, preventing operation of the TDAFP. Uncontrolled cooldown is mitigated by FCHV0312 tripping on high speed. The Train A and Train B MDAFPs are available to supply feedwater to all four steam generators.

Cables 12ABI20FJ, 12ABI20FL, 12ABI20FM and 12ABI20FN associated with steam generator B ARV ABPV0002 are run in this area. Damage to these cables could cause the ARV to spuriously open and could prevent control from the control room. If this occurs, operators may need to control or close ABPV0002 using local controller ABFHC0002 in room 1509.

Cable 12RLK01AA supplies power to RL005/RL006 from switch NK4206. The PFSSD components on RL005/RL006 supplied by NK4206 are ABHV0005 and ABHV0006. Loss of power will fail the valves open, which is desired for operation of the turbine driven auxiliary feedwater pump (TDAFP).

Cable 12RPY09AA supplies 120 VAC power from NN0208 to BOP instrument rack RP053DA. Damage to this cable will affect the following PFSSD components:

- ALPY0038A - ESFAS LOW SUCTION PRESSURE SIGNAL CONVERTER
- ALPT0038 - ESFAS LOW SUCTION PRESSURE TRANSMITTER
- ABPIC0002A - STM GEN B ATM STEAM DUMP PRESSURE CONTROLLER
- ABHS0002 - ABPV0002 HANDSWITCH
- ALPI0026A - TDAFW PUMP PAL02 SUCTION PRESSURE

Low suction pressure (LSP) on 2 out of 3 AFW pressure transmitters (ALPT0037, ALPT0038 and ALPT0039) coincident with an auxiliary feedwater actuation signal (AFAS) will swap the AFW supply to ESW. Loss of power to ALPT0038 and ALPY0038A will satisfy 1/3 LSP logic, placing the LSP signal logic in a 1 out of 2 configuration. In addition, damage to cable 12ALI08BA will prevent operation of ALPT0038 but ALPT0037 and ALPT0039 are unaffected. Therefore, low suction pressure or loss of power on ALPT0037 or ALPT0039 will provide the permissive to swap if an AFAS is present.

Loss of power to ABPIC0002A and ABHS0002 could prevent operation of steam generator B ARV ABPV0002 from the control room. If this occurs, operators may need to control or close ABPV0002 using local controller ABFHC0002 in room 1509.
Loss of power to ALPI0026A will provide false indication of TDAFP suction pressure. In addition, one other cable (12ALI07KF) associated with pressure indicator ALPI0026A is located in this area. Damage to these cables will prevent indication of TDAFP suction pressure in the main control room. The transmitter does not initiate any automatic functions and the TDAFP is not credited for a fire in this area. Train A and Train B MDAFP suction pressure indicators are unaffected.

Panel SA036C monitors pressure transmitter signals on ALPT0038 and provides AFAS outputs. Power cables 12SAK21CA and 12SAY21CA associated with SA036C are run in this area. Damage to these cables could result in a loss of power to the panel but will not prevent automatic operation of low suction pressure (LSP) swapover since the remaining 2 channels are available. AFAS is not credited for PFSSD but is analyzed for potential adverse impacts.

Based on the above discussion, the TDAFP may be affected but both MDAFPs are available to provide feedwater to the steam generators. Steam generator B ARV ABPV0002 may need to be controlled or closed using local controller ABFHC0002. Uncontrolled blowdown through the TDAFP is mitigated by FCHV0312 automatically tripping on high speed.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: XX-E-013, E-15000, E-13AB01, E-13AB01A, E-13AB20B, E-13FC23, E-13FC24, E-13RL01, E-13RP09, E-13RP15, E-1F9101, J-02AB01, J-02AB03, J-110-00348, J-110-00590, J-110-00642, J-110-00647, J-110-00938, J-110-00942, M-12AB01, M-12AB02, M-12FC02

5.2.2 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

The outputs from each safeguards bus (NB01 and NB02) are divided into 4 separation groups; 1, 2, 3 and 4 and routed to two control panels, NF039A and NF039B. The input section of each control panel also receives group 1, 2, 3 and 4 instrument power (120VAC). The inputs then pass through isolation devices, at which point all inputs to NF039A become separation group 1 and all inputs to NF039B become separation group 4. Interruption of either the inputs or the instrument power from one separation group would impact the associated input channel, but would not impact the other 3 input channels.

Cable 12NFY01CA supplies 120 VAC power to LSELS panel NF039A. Cable 12NFY01DA supplies 120 VAC power to LSELS panel NF039B. Panels NF039A and NF039B have four sources of Class 1E 120 VAC power, each from separate 120 VAC distribution switchboards, two on Train A and two on Train B. The LSELS system operates when a degraded voltage condition exists on 2 out of 4 sensors on a single 4,160-Volt Class 1E bus. Loss of one source of AC power to each panel will have no adverse impact on PFSSD since 120 VAC power remains available from the remaining three sources.

Cables 12NFK01CA and 12NFK01DA are associated with separation group 2 UV relays on buses NB01 and NB02, respectively. Cables 12NFY01EA and 12NFY01FA are associated with separation group 2 degraded voltage PTs on buses NB01 and NB02, respectively. Cables

associated with the remaining three UV relays and PTs from separation groups 1, 3 and 4 do not run in fire area C-32.

Automatic functioning of the bus NB01 and NB02 emergency load shedder / sequencer is unaffected by a fire in area C-32 because of the presence of circuits for only one of the four load shed/sequencer initiators. Therefore, a spurious start of the Train A and Train B diesel generators due to a false undervoltage condition on two of the four circuits is not credible.

Based on the above discussion, the Train A and Train B load shed/sequencers are available if a fire occurs in this area. Off-site power to both trains is unaffected based on Calculation XX-E-013, Appendix 2.

References: XX-E-013, E-15000, E-11005, E-13NF01, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, J-104-00347

5.2.3 Process Monitoring

Process monitoring is required to achieve and maintain safe shutdown. Some of the process instruments credited for safe shutdown could be affected by a fire in area C-32. These instruments, as well as the available redundant capability, are described in the following paragraphs.

Steam generator level indication is required to support the decay heat removal function. Each steam generator has one wide range and four narrow range level transmitters. At least one level transmitter is required on each steam generator being used for heat removal. Cables 12AEI08EB, 12AEI08FB, 12AEI12BB and 12AEI12CB associated with AELT0519 (SG A NR), AELT0549 (SG D NR), AELT0552 (SG B NR) and AELT0553 (SG C NR), respectively, are run in fire area C-25. Cables for the remaining level transmitters are not run in fire area C-25. Therefore, at least one level indicator on all four steam generators is available.

RCS hot and cold leg temperature indication is required on at least one loop to verify sufficient flow through the steam generators to ensure RCS decay heat removal. The following table lists the RCS temperature elements credited for PFSSD.

RCS Hot and Cold Leg Temperature Elements Used for PFSSD	
COMPONENT	**FUNCTION**
BBTE0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	RCS Cold Leg Temperature Element (WR) Loop 4

Temperature elements BBTE0413B and BBTE0433A, as well as associated temperature indicators, could be affected by a fire in this area due to damage to cables 12BBI15EB and 12BBI15KB. In addition, loops 2 and 4 temperature indication at the auxiliary shutdown panel (ASP) using BBTI0423X and BBTI0443A could be affected due to damage to cables 12SBS16BA and 12SBS16HA. The remaining temperature elements/indicators are unaffected. A fire in this area does not require temperature indication at the ASP. Therefore, RCS hot and cold leg temperature indication remains available on loops 2 and 4.

Cable 12SBS16GA is associated with narrow range pressurizer level indicator BBLI0460B located at the auxiliary shutdown panel. Cables associated with pressurizer level indication in the main control room are unaffected. Therefore, pressurizer level indication is available.

Based on the above discussion, process monitoring is available if a fire occurs in fire area C-32.

References: E-15000, XX-E-013, E-13AE08, E-13AE12, E-13BB15, E-13BB16, E-13SB09, E-13SB16, E-1F9201, E-1F9203, E-1F9301, M-12AE02, M-12BB01, M-12BB02

5.2.4 Residual Heat Removal

Hot shutdown mode of PFSSD requires isolation of the RCS to RHR flow path by maintaining either BBPV8702A or EJHV8701A closed and either BBPV8702B or EJHV8701B closed. Cold shutdown mode of PFSSD requires RHR taking suction from the RCS. RHR pump suction from the RCS is controlled by valves BBPV8702A and EJHV8701A (Train A) and BBPV8702B and EJHV8701B (Train B). Both trains of RHR are available if a fire occurs in this area.

Damage to cable 12BBI15NB, associated with pressure transmitter BBPT0403, could initiate a false High-1 RCS pressure signal and open the contacts on relay K734. This false High-1 pressure signal would prevent remote opening of valves BBPV8702A and BBPV8702B. Therefore, a fire in this area may require a cold shutdown repair or a containment entry to open valve BBPV8702A or BBPV8702B prior to initiating RHR for cold shutdown.

Based on the above discussion, RHR is available using either train but suction from the RCS may need to be manually aligned prior to starting the RHR pumps.

References: E-15000, XX-E-013, E-13BB12A, E-13BB12B, E-13BB15, E-1F9205, M-12BB01

5.2.5 Reactor Protection System

The Reactor Protection System (RPS) monitors specified input parameters and initiates reactor protection features whenever those parameters are outside specified limits. Field installed transmitters continuously monitor various parameters and report the results to one of four process cabinets, one per channel. Signals are then sent from the process cabinets to both solid state protection cabinets, one on each train. The cabinets and associated channel are listed in the following table.

Process Cabinets	Solid State Protection Cabinets
Cabinet SB038 - Channel 1 Cabinet SB042 - Channel 2 Cabinet SB037 - Channel 3 Cabinet SB041 - Channel 4	Cabinet SB029A - Train A Input Cabinet Cabinet SB029B - Train A Logic Cabinet Cabinet SB029C - Train A Output Cabinet 1 Cabinet SB029D - Train A Output Cabinet 2 Cabinet SB032A - Train B Input Cabinet Cabinet SB032B - Train B Logic Cabinet Cabinet SB032C - Train B Output Cabinet 1 Cabinet SB032D - Train B Output Cabinet 2

The RPS is actuated upon 2/3 or 2/4 coincident logic, depending on the input parameter. This ensures that a loss of a single channel will not prevent the system from performing it's function.

Cables 12SBS01BD, 12SBS02BD and 12SBY09DA associated with reactor protection system channel 2 run through this area. These cables supply power from separation group 2 power supplies to panels SB029A, SB032A and SB042. Damage to these cables could cause a loss

of RPS channel 2, but channels 1, 3 and 4 remain available. Therefore, the RPS is available if a fire occurs in this area.

References: XX-E-013, E-15000, E-13NN01, E-13SB01, E-13SB02, E-13SB03, E-13SB04, E-13SB05, E-13SB09, E-1F9431, E-1F9432, E-1F9433, J-10SA

5.2.6 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available to provide indication of cold shutdown reactivity conditions. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B.

Cable 12SES02AA supplies power to SE054B from NN0211. Panel SE054B is associated with source range neutron monitor SENE0032B. Loss of power to the panel will prevent SENE0032B from operating. Source range indication remains available using SENI0031B, SENI0060A/B and SENI0061A/B.

References: XX-E-013, E-15000, E-13SE02, E-1F9101

5.2.7 Safety Injection and Containment Spray

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. A spurious containment spray actuation signal (CSAS) could cause the containment spray pumps to operate, depleting inventory in the RWST. These conditions are not desirable for PFSSD at Wolf Creek.

Safety injection (SI) is initiated automatically by any of the following conditions:

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Containment spray (CS) is initiated automatically by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937.

Cables 12ABI21KA, 12ABI21NA, 12ABI21SA and 12ABI21VA associated with steam line pressure transmitters ABPT0515, ABPT0525, ABPT0535, ABPT0545 run in fire area C-32. Cables for the remaining steam line pressure transmitters are unaffected by a fire in area C-32. Therefore, a spurious SI signal due to low steam line pressure will not occur in the event of a fire in area C-32.

A cable (12BBI16LB) associated with pressurizer pressure transmitter BBPT0456 is run in area C-32. Cables associated with the remaining pressurizer pressure transmitters are unaffected by a fire in area C-32. Therefore, a spurious SI signal due to low pressurizer pressure will not occur in the event of a fire in area C-32.

A cable (12GNI05BA) associated with containment pressure transmitter GNPT0936 is run in area C-32. Cables associated with the remaining containment pressure transmitters are unaffected by a fire in area C-32. Therefore, a spurious SI and CSAS due to high containment pressure will not occur in the event of a fire in area C-32.

Based on the above discussion, a spurious SIS and CSAS cannot occur if a fire occurs in this area.

References: E-15000, XX-E-013, E-13AB21, E-13BB16, E-13GN05, E-1F9431, E-1F9432, E-1F9433, M-12AB01, M-12BB02, M-12GN01

5.2.8 Refueling Water Storage Tank

The RWST is credited in the PFSSD analysis as the primary source of borated water to achieve cold shutdown. The Wolf Creek Technical Specifications ensure the minimum quantity and boron concentration is maintained to achieve cold shutdown. Therefore, RWST level transmitters, indicators and circuits are not evaluated for level control.

The RWST level transmitters and associated circuits are included in the PFSSD analysis because of the automatic functions they perform. A low-low level in the RWST on 2 out of 4 RWST level transmitters, coincident with a safety injection signal, will provide a permissive for containment sump isolation valves EJHV8811A and EJHV8811B to open. This could cause the RWST to drain to the containment sump if the associated RWST to RHR valve does not close.

A cable (12BNI07DA) associated with refueling water storage tank (RWST) level transmitter BNLT0931 runs in fire area C-32. Cables for the remaining three RWST level transmitters are unaffected. Therefore, a spurious low-low level in the RWST is not credible if a fire occurs in this area.

Based on the above discussion, the RWST is available if a fire occurs in area C-32.

References: E-15000, XX-E-013, E-13BN07, E-13EJ06A, E-13EJ06B, E-1F9102, E-1F9201, E-1F9205, E-1F9302, M-12BN01, M-12EJ01, M-767-00162, M-767-00165, M-767-00168, M-767-00189

5.2.9 Relay Rack RP334

Cable 12RPK09BA supplies 125 VDC power from NK4201 to auxiliary relay rack RP334. The only relays in RP334 that are required for PFSSD are 86XRP1, 86XRP2 and 86XRP3. These are lockout relays used to isolate the control room if a fire occurs in the control room. Loss of DC power to the relays will prevent isolating the control room but will not cause a spurious control room isolation signal. Control room isolation is not required if a fire occurs in area C-32. Therefore, loss of DC power will not impact PFSSD.

References: XX-E-013, E-15000, E-13RP09, E-093-00093

5.2.10 Pressurizer Pressure Control

The pressurizer pressure control system is included in the PFSSD analysis because spurious operation of the pressurizer pressure control system could have adverse consequences on PFSSD. A valid high pressure signal will open the pressurizer PORVs and pressurizer spray valves, which is not desired for PFSSD.

An instrument cable (12BBI16LB) associated with pressurizer pressure transmitter BBPT0456 is run in fire area C-32. Damage to this cable could send a spurious high-pressure signal to the Ovation pressure control system. As discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure input channel will not cause the spurious operation of the pressurizer spray valves or PORVs due to the Ovation 4-channel validation logic, which uses the 2nd highest signal as the validated signal and has built-in logic to detect and ignore a failed input.

Based on the above discussion, pressurizer PORVs and pressure spray valves will not spuriously operate if a fire occurs in this area.

References: E-15000, XX-E-013, E-13BB16, E-1F9301, DCP 13324

FIRE AREA C-33

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-33 is located on the 2073-6 elevation of the Control Building and includes the rooms listed in Table C-33-1.

Table C-33-1
Rooms Located in Fire Area C-33

ROOM #	DESCRIPTION
3804	South Electrical Chase - 2073-6 Elevation

Fire area C-33 is protected by an automatic wet-pipe sprinkler system. In addition, automatic fire detection is installed throughout. The automatic suppression and detection system meets the requirements of 10CFR50, Appendix R, Section III.G.2.c.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-33-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-33-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-33

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Cables associated with S/G ARV ABPV0004 may be damaged, preventing control of this valve from the control room. The ARV can be isolated using ABPIC0004B at the auxiliary shutdown panel (RP118B). Steam line pressure transmitters ABPT0516 and ABPT0546 may be affected. The remaining steam line pressure transmitters are unaffected. The capability to isolate the MSIVs and bypass valves using hand switch ABHS0079 may be affected. The MSIVs and bypass valves can be isolated using hand switch ABHS0080. A number of main steam valves located downstream of the MSIVs could open. This will have no adverse impact on PFSSD since the MSIVs and bypass valves can be isolated.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.
AE	Main Feedwater	H, P	All PFSSD functions associated with the main feedwater system are satisfied. Steam generator (SG) level indication is available on SG B using wide range level transmitter AELT0502 and narrow range level transmitters AELT0528, AELT0529 and AELT0552. Steam generator level indication is available on SG C using wide range level transmitter AELT0503 and narrow range level transmitters AELT0538, AELT0539 and AELT0553. The capability to isolate the MFIVs using hand switch AEHS0081 may be affected. Isolate the MFIVs using hand switch AEHS0080.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. Train B motor driven auxiliary feedwater pump (MDAFP) and the turbine driven auxiliary feedwater pump may be affected. Train A MDAFP is available to supply auxiliary feedwater to SGs B and C. Steam generator A flow transmitter ALFT0007 may be affected. Steam generators B, C and D flow transmitters are unaffected.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.

Table C-33-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-33

System	System Name	PFSSD Function*	Comments
BB	Reactor Coolant System	R, M, H, P, S	All PFSSD functions associated with the reactor coolant system are satisfied. All four seal water injection valves will remain open. When transferring to RHR, valve BBPV8702A may need to be manually opened or a cold shutdown repair performed to provide a suction source from the RCS to RHR pump A. Pressurizer PORV BBPCV0456A may open and block valve BBHV8000B may not close. If this occurs, Operators can close the PORV by placing BBHIS0456A in the CLOSE position. Pressure indicator BBPI0406 may not function. Pressure indicator BBPI0405 is unaffected. Reactor vessel head vent valve BBHV8002B could spuriously open. The remaining head vent valves are unaffected and will remain closed to isolate the head vent flow path. RCS temperature recorders BBTR0433 and BBTR0443 on loops 3 and 4 could lose power. Temperature indication on loops 1 and 2 remains available. Pressurizer pressure transmitter BBPT0458 could be affected. The remaining pressurizer pressure transmitters are unaffected. Pressurizer pressure indication is available using BBPI0455A, BBPI0456 and BBPI0457.
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. Train A Centrifugal Charging Pump (CCP) is available to provide charging flow from the RWST. Train B CCP miniflow valve BGHV8111 may be affected. Train A CCP miniflow valve BGHV8110 is unaffected. Valve BGHV8105 may be affected. Redundant valve BGHV8106 is unaffected and can be closed using hand switch BGHIS8106 to isolate flow to the regenerative heat exchanger. VCT isolation valve BGLCV0112C may be affected but redundant valve BGLCV0112B can be isolated using BGHIS0112B. CCP B to RCP seal injection valve BGHV8357B could be affected. Redundant Train A CCP to RCP seal injection valve BGHV8357A is unaffected. VCT level transmitter BGLT0185 may be affected. VCT level transmitter BGLT0112 is unaffected. Excess letdown valve BGHV8154B could spuriously open. Redundant valve BGHV8153B is unaffected. RCP seal flow indication is available using BGFI0215A. RCP seal flow indicator BGFI0215B may be affected.
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blowdown system are satisfied. Steam generator blowdown is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C, located on the BM157 panel in the radwaste control room.
BN	Borated Refueling Water Storage System	R, M, H	The RWST is available to provide a suction source to Centrifugal Charging Pump A via valve BNLCV0112D. RWST level indication is available using BNLI0930, BNLI0931 and BNLI0932.

Table C-33-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-33

System	System Name	PFSSD Function*	Comments
EF	Essential Service Water System	H, S	All PFSSD functions associated with the Essential Service Water (ESW) system are satisfied. A number of components associated with Train B ESW may be affected. Train A ESW is available.
EG	Component Cooling Water System	S	All PFSSD functions associated with the Component Cooling Water (CCW) system are satisfied. Train B CCW may be affected. Train A CCW is available. CCW flow to the RCP thermal barrier could be temporarily disrupted due to closure of valves EGHV0062 and EGHV0071. Valves EGHV0132 and EGHV0126 can be opened from the control room to restore CCW flow to the thermal barriers. CCW to RCP flow indicator EGFI0129 could be affected. CCW to RCP flow indicator EGFI0128 is unaffected. Valve EGHV0102 could be affected, preventing operation of Train B RHR. Valve EGHV0101 is unaffected.
EJ	Residual Heat Removal System	M, H, P	All PFSSD functions associated with Residual Heat Removal (RHR) system are satisfied. The Train B RHR pump may be affected but the Train A RHR pump is available. Loss of RCS inventory through the RHR flow path is prevented by maintaining valves EJHV8701A and EJHV8701B closed. Valve EJHV8701A can be opened from the control room when transitioning to RHR for cold shutdown. RHR pump B mini-flow valve EJFCV0611 is affected but RHR pump A mini-flow valve EJFCV0610 is available. RHR Train B to SI Pump B isolation valve EJHV8804B could spuriously open. RHR Train A to CVCS valve EJHV8804A is unaffected. Train B RHR pump discharge to RCS cold leg isolation valve EJHV8809B is affected. Train A RHR pump discharge to RCS cold leg isolation valve EJHV8809A is unaffected. Valve EJHV8840 could spuriously open in the event of a fire in this area. This will not affect hot standby, however the valve will need to be locally closed prior to entering shutdown cooling mode. RHR Train B flow control valve EJHCV0607 could be affected. RHR Train A flow control valve EJHCV0606 is unaffected.
EM	High Pressure Coolant Injection	R, M	Train B safety injection pump PEM01B could spuriously start. Injection will not occur with the reactor at normal pressure. The pump can be stopped by opening breaker NB0202, but this action is not required for PFSSD. Charging flow from CCP A to the RCS is available through the BIT by opening valves EMHV8803A and EMHV8801A. Prevent flow diversion through the SIS test line when charging through the BIT by maintaining valve EMHV8964 closed.
EN	Containment Spray	R, M	Containment spray pump PEN01B could spuriously start and valve ENHV0012 could open, causing containment spray. Pump PEN01B can be stopped by opening breaker NB0203 in area C-10. Containment spray pump PEN01A is unaffected.

Table C-33-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-33

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD Decay Heat Removal function associated with the Safety Injection Accumulators is satisfied. Accumulator injection lines can be isolated by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. It may be necessary to make a containment entry to manually close EPHV8808B and EPHV8808D prior to the RCS reaching 1000 psig.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.
FC	Auxiliary Turbines	R, H, P	Turbine driven auxiliary feedwater pump steam trap valve FCFV0310 may not close. Uncontrolled blowdown through this 1-inch line will not cause unacceptable RCS cooldown and will not impact PFSSD. Turbine driven steam generator feedwater pump B main steamline low point drain valve FCHV0103 may not close. This will have no adverse impact on PFSSD since the MSIVs and MSIV bypass valves can be isolated using ABHS0080.
GD	ESW Pump House HVAC	S	The PFSSD function associated with ESW pump house HVAC is satisfied. The Train B ESW pump room ventilation system could be affected. The Train A ESW pump room ventilation system is unaffected.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function associated with the Control Room and Class 1E Switchgear Room Coolers is satisfied. Train B control room A/C unit SGK04B may be affected. Train A control room A/C unit SGK04A is unaffected. Train B Class 1E electrical equipment room A/C unit SGK05B may be affected. Train A Class 1E electrical equipment room A/C unit SGK05A is unaffected. Train B control room A/C dampers GKHZ0040A and GKHZ0040B could be affected. Train A control room A/C dampers are unaffected.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function associated with the emergency diesel generator room HVAC system is satisfied. The Train B emergency diesel generator exhaust damper GMHZ0019 could be affected. The Train A diesel generator room HVAC system is unaffected.
GN	Containment Coolers	S	The PFSSD function associated with the containment coolers is satisfied. Train B containment coolers SGN01B and SGN01D could be affected. Train A containment coolers SGN01A and SGN01C are available. Containment pressure transmitter GNPT0934 could be affected. The remaining three pressure transmitters are unaffected.

Table C-33-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-33

System	System Name	PFSSD Function*	Comments
JE	Diesel Fuel Oil	S	The PFSSD function associated with the Diesel Fuel Oil System is satisfied. The Train B emergency fuel oil transfer pump PJE01B may be affected. The Train A emergency fuel oil transfer pump PJE01A is unaffected. The Train B emergency diesel generator day tank level transmitter JELT0021 may be affected. The Train A day tank level transmitter is unaffected.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.
KJ	Standby Diesel Engine	S	The PFSSD function associated with the Standby Diesel System is satisfied. The Train B diesel engine may be affected. The Train A diesel engine is unaffected.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.
NB	4.16 kV System	S	The PFSSD function associated with the class 1E 4.16 kV system is satisfied. A loss of off-site and on-site power to NB02 may occur. On-site and off-site power to NB01 is unaffected.
NE	Standby Diesel Generator	S	The PFSSD function associated with the standby diesel system is satisfied. The Train B standby diesel generator could be affected. The Train A standby diesel generator is unaffected.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function associated with the load shed/emergency load sequencing system is satisfied. Cables associated with one of the four undervoltage (UV) relays and degraded voltage potential transformers on Trains A and B are run in fire area C-33. Emergency load shed/sequencer operates when 2/4 UV relays sense undervoltage on the bus. Therefore, automatic operation of the load shed/sequencer is unaffected.
NG	480V Load Centers and MCCs	S	The PFSSD function associated with the class 1E 480 volt load centers is satisfied. A loss of off-site and on-site power to Train B 480 VAC Class 1E load centers and MCCs could occur. Off-site and on-site power to Train A 480 VAC Class 1E load centers and MCCs is available.
NK	125VDC	S	Train B class 1E 125 VDC power could be disrupted to control room panels RL001/RL002, RL005/RL006, RL017/RL018, RL019/RL020, RL021/RL022 and RL023/RL024. Train A class 1E 125 VDC power is unaffected. The normal source of power to NK02 and NK04, through the Train B 480 V distribution system, could be disrupted. 125 VDC battery sets NK012 and NK014 are unaffected. Train B class 1E 125 VDC power could be disrupted to RPS output panel SB032D. 125 VDC power is available to Train A RPS output panel SB029D.

Table C-33-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-33

System	System Name	PFSSD Function*	Comments
NN	120VAC	S	The backup source of power to Train B Class 1E electrical distribution switchboards NN02 and NN04 could be affected. The normal source of power to NN02 and NN04 is unaffected due to the availability of 125 VDC battery sets NK012 and NK014. Train A Class 1E electrical distribution switchboards NN01 and NN03 are unaffected.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.
PG	480V Load Centers and MCCs	S	Power from PG20GBR217 to RL023 could be affected. Power from PG19GCR217 to RL023 is unaffected. Load Center PG20 could lose power due to loss of PG2001. Redundant capability is available.
PK	125VDC	S	The PFSSD function associated with the non-class 1E 125 VDC system is satisfied. Battery charger PK22 may be affected. Battery set PK12 will maintain 125 VDC power to PK02. Also, Train A non-class 1E 125 VDC system is unaffected.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.
PN	120VAC	S	Power from PN0833 to RL017/RL018 may be affected. Power from PN0835 to RL021/RL022 may be affected. Power from PN0736 and PN0738 to RL017/RL018 and RL021/RL022 is unaffected.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.
RL	Control Room MCB	S	The PFSSD function associated with the control room panels is satisfied. Train B Class 1E 125 VDC power to panels RL001/RL002, RL005/RL006, RL017/RL018, RL019/RL020, RL021/RL022 and RL023/RL024 could be disrupted. The components either fail in the desired PFSSD position or the redundant Train A component is available. Train A Class 1E 125 VDC power is unaffected. Non class 1E (separation group 6) 120 VAC power to panels RL017/RL018, RL021/RL022 and RL023/RL024 could be affected. Non class 1E (separation group 5) 120 VAC power to panels RL017/RL018, RL021/RL022 and RL023/RL024 is unaffected.
RP	Miscellaneous Control Panels	R, M, H, P, S	Power to BOP instrument rack RP053B could be disrupted. BOP instrument racks RP053A, RP053D and RP147 are unaffected. Train B 120 VAC control power to panel RP068 could be affected. Train A 120 VAC control power to panel RP068 is unaffected. Power to Group 2 Process Control Rack RP047 could be affected. This will not affect PFSSD as discussed in Section 5.2.12.

Table C-33-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-33

System	System Name	PFSSD Function*	Comments
SA	ESFAS	S	125 VDC and 120 VAC power to panel SA036B could be lost, resulting in a loss of Channel 4 Engineered Safety Features Actuation System (ESFAS). Redundant Channels 1, 2 and 3 ESFAS are unaffected. Status panel input for GKHZ0040A/B, SGK04B and SGK05B could be affected. This will not adversely impact PFSSD.
SB	Reactor Protection System	R, S	All PFSSD functions associated with the reactor protection system are satisfied. A loss of power to input channel 4 in SB029A and SB032A could occur. Input channels 1, 2 and 3 remain available. Train B output cabinet SB032D could lose power. Train A output cabinets are unaffected. Channel 4 process protection panel SB041 could lose power. Process protection channels 1, 2 and 3 remain available. Train B reactor trip switchgear SB102B could be affected. Train A reactor trip switchgear SB102A is unaffected.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.
SE	Ex-Core Neutron Monitoring	R, P	All PFSSD functions associated with the ex-core neutron monitoring system are satisfied. The source range recorder for source range monitor SENY0061B could be affected. Source range monitoring remains available using SENE0031, SENE0032 and SENY0060A/B
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-33.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-33. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator Atmospheric Relief Valves

Cables associated with S/G ARV ABPV0004 may be damaged, preventing control of this valve from the control room. The ARV can be isolated using ABPIC0004B at the auxiliary shutdown panel (RP118B).

3.1.2 Steam Generator Blowdown Isolation

Blowdown may not be isolable using BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A. Therefore, it may be necessary to isolate blowdown using BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C located on BM157 in the Radwaste Control room.

3.1.3 **Containment Spray Pump** (OMA, refer to E-1F9900)

Containment spray pump PEN01B could spuriously start and valve ENHV0012 could open, causing containment spray. The pump can be stopped by opening breaker NB0203 in area C-10. Access is available without traversing area C-33 and emergency lighting is provided.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Main Steam Isolation Valves and MSIV Bypass Valves

The capability to isolate the MSIVs and bypass valves using hand switch ABHS0079 may be affected. The MSIVs and bypass valves can be isolated using hand switch ABHS0080.

3.2.2 Main Feedwater Isolation Valves

The capability to isolate the MFIVs using hand switch AEHS0081 may be affected. Isolate the MFIVs using hand switch AEHS0080.

3.2.3 Volume Control Tank

Valve BGLCV0112C may not close in response to a signal from the control room. Redundant valve BGLCV0112B can be isolated using BGHIS0112B on RL001.

3.2.4 Thermal Barrier Cooling

CCW flow to the thermal barrier cooling coils could be lost due to the spurious closure of valves EGHV0062 and EGHV0071. If this occurs, operators could open bypass valves EGHV0132 (EGHV0062 bypass) and EGHV0126 (EGHV0071 bypass) using EGHIS0132 and EGHIS0126, respectively. Otherwise, operators should close EGHV0061 using EGHIS0061 to

prevent a steam bubble from damaging the CCW piping. CCW to RCP flow indicator EGFI0128 is available to diagnose a loss of CCW flow to the RCP thermal barriers.

3.2.5 Charging

If necessary to establish an alternate makeup and boration flowpath, the Train A CCP is available to charge through the BIT and valves EMHV8801A and EMHV8803A can be opened using EMHIS8801A and EMHIS8803A.

3.2.6 Component Cooling Water

Train B CCW could be affected by a fire in this area. If this occurs, swap to Train A CCW using normal operating procedures if Train A CCW is not already running.

3.2.7 Pressurizer PORV/Block Valve

Pressurizer PORV BBPCV0456A could spuriously open and block valve BBHV8000B may not close. If this occurs, Operators can close the PORV by placing BBHIS0456A in the CLOSE position. Pressurizer pressure indication is available using BBPI0455A, BBPI0456 and BBPI0457 located on RL002.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR

A number of Train B RHR components, including the Train B RHR pump, may be affected by a fire in this area. Use Train A RHR for shutdown cooling. Valve BBPV8702A may need to be manually opened, or a cold shutdown repair performed, when aligning Train A RHR.

Valve EJHV8840 could spuriously open in the event of a fire in this area. This will not affect hot standby, however the valve will need to be locally closed prior to entering shutdown cooling mode.

3.3.2 Safety Injection Accumulators

It may be necessary to make a containment entry to close SI Accumulator injection valves EPHV8808B and EPHV8808D if these valves are unresponsive from the control room. Otherwise, nitrogen pressure can be relieved from the tanks to prevent injection. Valves EPHV8808A and EPHV8808C are unaffected.

4.0 CONCLUSION

With some exceptions, redundant Post Fire Safe Shutdown capability exists if a severe fire occurs in area C-33. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-33.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-33

There are no PFSSD components located in area C-33. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-33-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-33. The applicable evaluation section is also listed in Table C-33-3.

Table C-33-3
PFSSD Cables Located in Fire Area C-33

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ABI20HJ	3804	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HL	3804	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HM	3804	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI20HN	3804	ABPV0004	I	5.2.1	SG D Atmospheric Relief Valve
14ABI21LA	3804	ABPT0516	I	5.2.2	Steam Generator A Pressure Transmitter
14ABI21WA	3804	ABPT0546	I	5.2.2	Steam Generator D Pressure Transmitter
14ABK08DA	3804	ABUV0034	C	5.2.3	Steam Dump/Cooldown to the L.P. Condenser
14ABK08EA	3804	ABUV0045	C	5.2.3	Steam Dump/Cooldown to the H.P. Condenser
14ABK08FA	3804	ABUV0041	C	5.2.3	Steam Dump/Cooldown to the I.P. Condenser
14ABK11AA	3804	ABUV0037	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11BA	3804	ABUV0038	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11CA	3804	ABUV0039	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11DA	3804	ABUV0040	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11EA	3804	ABUV0036	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK11FA	3804	ABUV0042	C	5.2.3	Steam Dump Valve to the I.P. Condenser
14ABK11GA	3804	ABUV0043	C	5.2.3	Steam Dump Valve to the I.P. Condenser
14ABK11HA	3804	ABUV0044	C	5.2.3	Steam Dump Valve to the I.P. Condenser
14ABK11JA	3804	ABUV0035	C	5.2.3	Steam Dump Valve to the L.P. Condenser
14ABK23FE	3804	ABHV0012, ABHV0015, ABHV0018, ABHV0021	C	5.2.4	MSIV Bypass Valves
14ABK23FF	3804	ABHS0079	C	5.2.4	MSIV & MSIV Bypass Valves Handswitch
14ABK23FG	3804	ABHV0012, ABHV0015 ABHV0018, ABHV0021	C	5.2.4	MSIV Bypass Valves

Table C-33-3
PFSSD Cables Located in Fire Area C-33

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ABK28AH	3804	ABHV0017	C	5.2.5	Main Steam Isolation Valve
14ABK28BH	3804	ABHV0011	C	5.2.5	Main Steam Isolation Valve
14ABK29AH	3804	ABHV0014	C	5.2.5	Main Steam Isolation Valve
14ABK29BH	3804	ABHV0020	C	5.2.5	Main Steam Isolation Valve
14ABK30BB	3804	SA075B	P	5.2.5 5.2.7	125 VDC to MSFIS Cabinet SA075B from NK5423
14AEI08NB	3804	AELT0517	I	5.2.6	SG A Narrow Range Level Transmitter
14AEI08PB	3804	AELT0527	I	5.2.6	SG B Narrow Range Level Transmitter
14AEI08QB	3804	AELT0537	I	5.2.6	SG C Narrow Range Level Transmitter
14AEI08RB	3804	AELT0547	I	5.2.6	SG D Narrow Range Level Transmitter
14AEK16AH	3804	AEFV0040	C	5.2.7	SG B Main Feedwater Isolation Valve
14AEK16BH	3804	AEFV0042	C	5.2.7	SG D Main Feedwater Isolation Valve
14AEK17AH	3804	AEFV0039	C	5.2.7	SG A Main Feedwater Isolation Valve
14AEK17BH	3804	AEFV0041	C	5.2.7	SG C Main Feedwater Isolation Valve
14ALB01B1	3804	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALB01B2	3804	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALB01BD	3804	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALB01BG	3804	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALB01BP	3804	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALB01BR	3804	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALG02AF	3804	ALHV0034	C	5.2.8	Cond Storage Tank To MDAFW Pump B
14ALG02AG	3804	ALHV0034	C	5.2.8	Cond Storage Tank To MDAFW Pump B
14ALG04AF	3804	ALHV0030	C	5.2.8	ESW to Mtr Driven Aux Feedwater Pump B

Table C-33-3
PFSSD Cables Located in Fire Area C-33

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ALG04AG	3804	ALHV0030	C	5.2.8	ESW to Mtr Driven Aux Feedwater Pump B
14ALG04DF	3804	ALHV0033	C	5.2.8	Train B ESW to TDAFP
14ALG04DG	3804	ALHV0033	C	5.2.8	Train B ESW to TDAFP
14ALI03AM	3804	ALHV0005	I	5.2.8	MDAFP B to SG D
14ALI03AP	3804	ALHV0005	I	5.2.8	MDAFP B to SG D
14ALI03BC	3804	ALHV0007	I	5.2.8	MDAFP B to SG A
14ALI03BD	3804	ALHV0007	I	5.2.8	MDAFP B to SG A
14ALI03BE	3804	ALHV0007	I	5.2.8	MDAFP B to SG A
14ALI03BF	3804	ALHV0007	I	5.2.8	MDAFP B to SG A
14ALI05AM	3804	ALHV0010	I	5.2.8	TDAFP to SG B
14ALI05AQ	3804	ALHV0010	I	5.2.8	TDAFP to SG B
14ALI05BC	3804	ALHV0012	I	5.2.8	TDAFP to SG C
14ALI05BD	3804	ALHV0012	I	5.2.8	TDAFP to SG C (ALHY0012)
14ALI05BE	3804	ALHV0012	I	5.2.8	TDAFP to SG C
14ALI05BF	3804	ALHV0012	I	5.2.8	TDAFP to SG C
14ALI07HF	3804	ALPT0024	I	5.2.8	MDAFP B Suction Pressure
14ALI08CA	3804	ALPT0039	I	5.2.8	ESFAS AFW Low Suction Press Transmitter
14ALI09AA	3804	ALFT0007	I	5.2.8	Aux Feedwater to SG A Flow
14ALK01BA	3617	DPAL01B	C	5.2.8	Train B Auxiliary Feedwater Pump Motor
14ALY09BD	3804	ALHV0007	C	5.2.8	MDAFP B to SG A
14BBG04AC	3804	BBHV8351A	C	5.2.9	RCP A Seal Water Supply
14BBG04BC	3804	BBHV8351B	C	5.2.9	RCP B Seal Water Supply
14BBG04CC	3804	BBHV8351C	C	5.2.9	RCP C Seal Water Supply

Table C-33-3
PFSSD Cables Located in Fire Area C-33

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BBG04DC	3804	BBHV8351D	C	5.2.9	RCP D Seal Water Supply
14BBG12AF	3804	BBPV8702A	C	5.2.11	RCS Hot Leg 1 to RHR Pump A Suction
14BBG12AG	3804	BBPV8702A	C	5.2.11	RCS Hot Leg 1 to RHR Pump A Suction
14BBG12BF	3804	BBPV8702B	C	5.2.11	RCS Hot Leg 4 to RHR Pump B Suction
14BBG12BG	3804	BBPV8702B	C	5.2.11	RCS Hot Leg 4 to RHR Pump B Suction
14BBG39BC	3804	BBHV8000B	C	5.2.12	Pressurizer PORV BBPCV0456A Block Valve
14BBI16BB	3804	BBPT0406	I	5.2.13	RCS Hot Leg Wide Range Pressure
14BBI16NB	3804	BBPT0458	I	5.2.2 5.2.12 5.2.42	Pressurizer Pressure Transmitter
14BBK30DA	3804	BBHV8002B	C	5.2.14	RX Vessel Head Vent
14BBK40BK	3804	BBPCV0456A	C	5.2.12	Pressurizer Power Operated Relief Valve
14BBK40BM	3804	BBPCV0456A	C	5.2.12	Pressurizer Power Operated Relief Valve
14BBK40BN	3804	BBPCV0456A	C	5.2.12	Pressurizer Power Operated Relief Valve
14BGB01BB	3804	DPBG05B	C	5.2.15	Train B Centrifugal Charging Pump Motor
14BGG11AC	3804	BGHV8105	C	5.2.16	Charging Pumps to Regenerative HX
14BGG11DC	3804	BGHV8111	C	5.2.15	CCP B Miniflow Valve
14BGG11DD	3804	BGHV8111	C	5.2.15	CCP B Miniflow Valve
14BGG12BC	3804	BGLCV0112C	C	5.2.17	VCT Outlet Valve
14BGG12BE	3804	BGLCV0112C	C	5.2.17	BNLCV112E Interlock
14BGG52BC	3804	BGHV8357B	C	5.2.9	CCP B Discharge to RCP Seals
14BGI51BA	3804	BGFT0215B	I	5.2.9	RCP Seal Total Flow Transmitter
14BGI51DA	3804	BGLT0185	I	5.2.17	VCT Level Transmitter

Table C-33-3
PFSSD Cables Located in Fire Area C-33

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BGK48BB	3804	BGHV8154B	C	5.2.18	Excess Letdown Isolation Valve
14BMK06AA	3804	BMHV0001	C	5.2.19	SG A Blowdown to Flash Tank
14BMK06AC	3804	BMHV0001	C	5.2.19	SG A Blowdown to Flash Tank
14BMK06BA	3804	BMHV0002	C	5.2.19	SG B Blowdown to Flash Tank
14BMK06BC	3804	BMHV0002	C	5.2.19	SG B Blowdown to Flash Tank
14BMK06CA	3804	BMHV0003	C	5.2.19	SG C Blowdown to Flash Tank
14BMK06CC	3804	BMHV0003	C	5.2.19	SG C Blowdown to Flash Tank
14BMK06DA	3804	BMHV0004	C	5.2.19	SG D Blowdown to Flash Tank
14BMK06DC	3804	BMHV0004	C	5.2.19	SG D Blowdown to Flash Tank
14BNG01BC	3804	BNLCV0112E	C	5.2.15	Charging Pump B Suction from RWST
14BNG01BD	3804	BNLCV0112E	C	5.2.15	Charging Pump B Suction from RWST
14BNG03BC	3804	BNHV8812B	C	5.2.20	RWST To RHR Pump B Suction
14BNI07FA	3804	BNLT0933	I	5.2.20	Refueling Water Storage Tank Level
14EFB01SA	3804	DPEF01B	C	5.2.21	Train B ESW Pump Motor
14EFB01SB	3804	DPEF01B	C	5.2.21	Train B ESW Pump Motor
14EFG02CC	3804	EFHV0025	C	5.2.21	Service Water to Train A ESW Cross Connect
14EFG02CD	3804	EFHV0025	C	5.2.21	Service Water to Train A ESW Cross Connect
14EFG02CE	3804	EFHV0025	C	5.2.21	Service Water to Train A ESW Cross Connect
14EFG02CF	3804	EFHV0025	C	5.2.21	Service Water to Train A ESW Cross Connect
14EFG02DC	3804	EFHV0026	C	5.2.21	Service Water to Train B ESW Cross Connect
14EFG02DD	3804	EFHV0026	C	5.2.21	Service Water to Train B ESW Cross Connect
14EFG02DE	3804	EFHV0026	C	5.2.21	Service Water to Train B ESW Cross Connect
14EFG02DF	3804	EFHV0026	C	5.2.21	Service Water to Train B ESW Cross Connect

Table C-33-3
PFSSD Cables Located in Fire Area C-33

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EFG03AC	3804	EFHV0039	C	5.2.21	ESW A to Service Water Cross Connect Valve
14EFG03AD	3804	EFHV0039	C	5.2.21	ESW A to Service Water Cross Connect Valve
14EFG03AE	3804	EFHV0039	C	5.2.21	ESW A to Service Water Cross Connect Valve
14EFG03BC	3804	EFHV0040	C	5.2.21	ESW B to Service Water Cross Connect Valve
14EFG03BD	3804	EFHV0040	C	5.2.21	ESW B to Service Water Cross Connect Valve
14EFG03BE	3804	EFHV0040	C	5.2.21	ESW B to Service Water Cross Connect Valve
14EFG04BC	3804	EFHV0060	C	5.2.21	Train B ESW from CCW B HX
14EFG05BC	3804	EFHV0052	C	5.2.21	Train B ESW to CCW B HX
14EFG06BC	3804	EFHV0038	C	5.2.21	ESW B To Ultimate Heat Sink
14EFG07BC	3804	EFHV0032	C	5.2.21	Train B ESW to Containment Air Coolers
14EFG08BC	3804	EFHV0050	C	5.2.21	Train B ESW from Containment Air Coolers
14EFG09BC	3804	EFHV0034	C	5.2.21	Train B ESW to Containment Air Coolers
14EFG09DC	3804	EFHV0046	C	5.2.21	Train B ESW from Containment Air Coolers
14EFI08RB	3804	EFPT0002	I	5.2.21	Train B ESW Pump Discharge Pressure
14EFI11FA	3804	EFFT0054	I	5.2.21	Train B ESW Flow Transmitter
14EGB01BB	3804	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BC	3804	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BD	3804	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BG	3804	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01BK	3804	DPEG01B	C	5.2.10	CCW Pump B Motor
14EGB01DB	3804	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGB01DC	3804	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGB01DD	3804	DPEG01D	C	5.2.10	CCW Pump D Motor

Table C-33-3
PFSSD Cables Located in Fire Area C-33

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EGB01DG	3804	DPEG01D	C	5.2.10	CCW Pump D Motor
14EGG05BC	3804	EGHV0016	C	5.2.10	CCW B Common Header Return
14EGG05DC	3804	EGHV0054	C	5.2.10	CCW B to Common Header
14EGG07BC	3804	EGHV0102	C	5.2.11	CCW to RHR HX B Isolation
14EGG09CC	3804	EGHV0071	C	5.2.10	CCW HX Out to RCP Ctmt Isolation
14EGG09CD	3804	EGHV0071	C	5.2.10	CCW HX Out to RCP Ctmt Isolation
14EGG10AC	3804	EGHV0062	C	5.2.10	CCW Return from RCP Thermal Barrier
14EGG10AD	3804	EGHV0062	C	5.2.10	CCW Return from RCP Thermal Barrier
14EGG18BC	3804	EGHV0127	C	5.2.10	CCW HX Out to RCP Bypass Isolation
14EGG18BD	3804	EGHV0127	C	5.2.10	CCW HX Out to RCP Bypass Isolation
14EGG18DC	3804	EGHV0133	C	5.2.10	EGHV0061 Bypass Valve
14EGG18DD	3804	EGHV0133	C	5.2.10	EGHV0061 Bypass Valve
14EGI13BA	3804	EGPT0078	I	5.2.10	CCW Pumps B and D Discharge Press
14EGI15AA	3804	EGFT0062	I	5.2.10	CCW Flow from RCP Thermal Barriers
14EGI19BB	3804	EGFT0129	I	5.2.10	CCW to RCP Flow Transmitter
14EGK16BA	3804	EGTV0030	C	5.2.10	CCW B HX Bypass Valve
14EGK16BC	3804	EGTV0030	C	5.2.10	CCW B HX Bypass Valve
14EJB01BB	3804	DPEJ01B	C	5.2.11	RHR Pump B Motor
14EJG04BC	3804	EJHV8804B	C	5.2.11	RHR B Supply To SI Pump B Iso Valve
14EJG06BC	3804	EJHV8811B	C	5.2.20	Containment Recirc Sump Iso Valve
14EJG08BC	3804	EJFCV0611	C	5.2.11	RHR Pump B Miniflow Valve
14EJG09AC	3804	EJHV8840	C	5.2.11	RHR to RCS Hot Leg Loops 2 and 3
14EJG09AD	3804	EJHV8840	C	5.2.11	RHR to RCS Hot Leg Loops 2 and 3

Table C-33-3
PFSSD Cables Located in Fire Area C-33

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EJG09BC	3804	EJHV8809B	C	5.2.11	RHR to RCS Cold Leg Loops 3 & 4
14EJG09BD	3804	EJHV8809B	C	5.2.11	RHR to RCS Cold Leg Loops 3 & 4
14EMB01BB	3804	DPEM01B	C	5.2.22	Train B Safety Injection Pump Motor
14EMG02BC	3804	EMHV8803B	C	5.2.23	Charging Pump B to BIT Inlet Isolation Valve
14EMK04CA	3804	EMHV8843	C	5.2.23	Boron Injection Upstream Test Line
14EMK04EA	3804	EMHV8871	C	5.2.23	SI Test Line from BIT
14ENB01BB	3804	DPEN01B	C	5.2.24	Containment Spray Pump B Motor
14ENG03BC	3804	ENHV0012	C	5.2.24	Containment Spray Pump B Isolation Valve
14ENG03BD	3804	ENHV0012	C	5.2.24	Containment Spray Pump B Isolation Valve
14EPG02CE	3804	EPHV8808B	C	5.2.25	Accumulator Tank B Outlet Iso Valve
14EPG02DE	3804	EPHV8808D	C	5.2.25	Accumulator Tank D Outlet Iso Valve
14FCK21AA	3804	FCFV0310	C	5.2.26	TDAFP Steam Trap Isolation Valve
14GDG01BF	3804	DCGD01B	C	5.2.21	ESW Pump Room Supply Fan B Motor (GDHS0011)
14GDY01BA	3804	CGD01B	C	5.2.21	Train B ESW Pump Room Supply Fan
14GDY01BB	3804	CGD01B	C	5.2.21	Train B ESW Pump Room Supply Fan
14GDY01BD	3804	CGD01B	C	5.2.21	ESW Pump Room B Supply Fan
14GKG02BE	3804	SGK04B	C	5.2.27	Control Room A/C Unit B (GKHS0040)
14GKG02BF	3804	SGK04B	C	5.2.27	Control Room A/C Unit B (GKHS0040)
14GKG13BE	3804	SGK05B	C	5.2.28	Class 1E Elec. Equip. Room A/C Unit B
14GKG13BF	3804	SGK05B	C	5.2.28	Class 1E Elec. Equip. Room A/C Unit B
14GKG13BG	3804	SGK05B	C	5.2.28	Class 1E Elec. Equip. Room A/C Unit B

Table C-33-3
PFSSD Cables Located in Fire Area C-33

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GKG13BL	3804	SGK05B	C	5.2.28	Class 1E Elec. Equip. Room A/C Unit B (GKHS0103)
14GKY02BA	3804	GKHZ0040A/B	C	5.2.27	Control Room A/C Unit 4B Supply/Discharge Dampers
14GMG01BH	3804	GMHS0011B	C	5.2.29	Train B Diesel Generator Room Supply Fan Isolation Switch
14GMK04BA	3804	GMHZ0019	C	5.2.29	Train B DG Room Exhaust Damper
14GMK04BB	3804	GMHZ0019	C	5.2.29	Train B DG Room Exhaust Damper
14GMK04BE	3804	GMHZ0019	C	5.2.29	Train B DG Room Exhaust Damper
14GNG02BD	3804	DSGN01B	C	5.2.30	Containment Cooler B Motor
14GNG02BH	3804	DSGN01B	C	5.2.30	Containment Cooler B Motor
14GNG02BJ	3804	DSGN01B	C	5.2.30	Containment Cooler B Motor
14GNG02BK	3804	DSGN01B	C	5.2.30	Containment Cooler B Motor
14GNG02DD	3804	DSGN01D	C	5.2.30	Containment Cooler D Motor
14GNG02DH	3804	DSGN01D	C	5.2.30	Containment Cooler D Motor
14GNG02DJ	3804	DSGN01D	C	5.2.30	Containment Cooler D Motor
14GNG02DK	3804	DSGN01D	C	5.2.30	Containment Cooler D Motor
14GNI05DA	3804	GNPT0934	I	5.2.2	Containment Atmosphere Pressure Transmitter
14JEG01BB	3804	DPJE01B	C	5.2.29	Train B Emergency Fuel Oil Transfer Pump Motor
14JEG01BE	3804	DPJE01B	C	5.2.29	Train B Emergency Fuel Oil Transfer Pump Motor
14JEI04BA	3804	JELT0021	I	5.2.29	Train B Emergency Fuel Oil Day Tank Level
14KJK03AH	3804	KKJ01B	C	5.2.29	Train B EDG
14KJK03AJ	3418	KKJ01B	C	5.2.29	Train B EDG

Table C-33-3
PFSSD Cables Located in Fire Area C-33

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14KJK03AK	3804	KKJ01B	C	5.2.29	Train B EDG
14KJK07AE	3804	NE106	C	5.2.29	Train B EDG Control Panel
14NBB04AB	3804	NBHS0011	C	5.2.31	NB02 Synchro-scope/Selector Switch
14NBB04AD	3804	NBHS0011	C	5.2.31	NB02 Synchro-scope/Selector Switch
14NBB04AE	3804	NBHS0011	C	5.2.31	NB02 Synchro-scope/Selector Switch
14NBB04AF	3804	NBHS0011	C	5.2.31	NB02 Synchro-scope/Selector Switch
14NBB05AC	3804	NBHS0008	C	5.2.31	XNB02 to NB0209 Synch Transfer Switch
14NBB06AC	3804	NBHS0009	C	5.2.31	XNB01 to NB0212 Synch Transfer Switch
14NBB14AA	3804	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AB	3804	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AC	3804	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AE	3804	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AF	3804	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB14AG	3804	NB00209	C	5.2.31	Bus NB02 Feeder Breaker NB0209 Control
14NBB15AA	3804	NB00212	C	5.2.31	Bus NB02 Feeder Breaker NB0212 Control
14NBB15AC	3804	NB00212	C	5.2.31	Bus NB02 Feeder Breaker NB0212 Control
14NEB02AL	3804	NE106	C	5.2.29	Train B Diesel Generator Control Panel
14NEB11AA	3804	NB00211	C	5.2.29	Train B D/G Feeder Breaker NB0211 Control
14NEB11AD	3804	NB00211	C	5.2.29	Train B D/G Feeder Breaker NB0211 Control
14NEK13AD	3804	NE106	C	5.2.29	Train B D/G Control Panel
14NEK13AJ	3804	NE106	I	5.2.29	Train B D/G Control Panel
14NFK01AA	3804	NF039C	P	5.2.32	Load Shed / Sequencer Ch 1 & 4 Terms
14NFK01CA	3804	NF039A	C	5.2.32	Load Shed / Sequencer Ch 1 Logic

Table C-33-3
PFSSD Cables Located in Fire Area C-33

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NFK01DA	3804	NF039B	C	5.2.32	Load Shed / Sequencer Ch 4 Logic
14NFY01EA	3804	NF039A	C	5.2.32	Load Shed / Sequencer Ch 1 Logic
14NFY01FA	3804	NF039B	C	5.2.32	Load Shed / Sequencer Ch 4 Logic
14NFY01GA	3804	NF039A	P	5.2.32	Load Shed / Sequencer Ch 1 Logic
14NFY01HA	3804	NF039B	P	5.2.32	Load Shed / Sequencer Ch 4 Logic
14NGB10AB	3804	NB00213	C	5.2.33	Breaker NB0213 to XNG02 Control
14NGB10BB	3804	NB00210	C	5.2.33	Breaker NB0210 to XNG04 Control
14NGB10SA	3804	NB00216	C	5.2.33	Breaker NB0216 to XNG06 Control
14NGG11AA	3804	NG00201	C	5.2.33	Breaker NG0201 Control
14NGG11BA	3804	NG00401	C	5.2.33	Breaker NG0401 Control
14PKK11AA	3804	PK022	C	5.2.33	NG0409 Breaker Control
14RLK01AA	3804	NK04407	P	5.2.34	125 VDC to RC & Support Sys Control Panel (RL001/RL002)
14RLK01BA	3804	NK04409	P	5.2.34	125 VDC to Turbine Gen & Fdwtr Ctrl Pnl (RL005/RL006)
14RLK01CA	3804	NK04412	P	5.2.34	125 VDC to ESF Control Panel (RL017/RL018)
14RLK01DA	3804	NK04413	P	5.2.34	125 VDC to ESF Control Panel (RL019/RL020)
14RLK01EA	3804	NK04414	P	5.2.34	125 VDC to Reactor Auxiliary Control Pnl (RL021/RL022)
14RLK01FA	3804	NK04411	P	5.2.34	125 VDC to Turbine Gen & Fdwtr Ctrl Pnl (RL023/RL024)
14RPY09BA	3804	RP053BC	P	5.2.35	120 VAC to BOP Instrumentation Rack from NN0416
14RPY09CA	3804	RP053BC	P	5.2.35	120 VAC to BOP Instrumentation Rack from NN0418

Table C-33-3
PFSSD Cables Located in Fire Area C-33

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14RPY10BA	3804	RP068	P	5.2.21	120 VAC to RP068 from NG02ACR136
14SAK21BA	3804	SA036B	P	5.2.8	125 VDC to SA036B from NK5409
14SAY21BA	3804	SA036B	P	5.2.8	120 VAC to SA036B from NN0403
14SAZ20EA	3804	GKHZ0040A/B	C	5.2.27	Status Panel SA066B Input from GKHZ0040A/B
14SAZ20GA	3804	SGK04B	C	5.2.27	Status Panel SA066B Input from SGK04B
14SAZ20HA	3804	SGK05B	C	5.2.28	Status Panel SA066B Input from SGK05B
14SAZ20NA	3804	SGK04B	C	5.2.27	Control Room A/C Unit
14SAZ20PA	3804	SGK05B	C	5.2.28	Status Panel SA066B Input from SGK05B
14SBS01DC	3804	SB029A	P	5.2.37	120 VAC to SSPS A Input Panel from NN0409
14SBS02DC	3804	SB032A	P	5.2.37	120 VAC to SSPS B Input Panel from NN0410
14SBS05BE	3804	SB032D	P	5.2.37	120 VAC to SSPS B Output Panel from NN0412
14SBS05BF	3804	SB032D	P	5.2.37	125 VDC to SSPS B Output Panel from NK4416
14SBS12BC	3804	SB102B	C	5.2.38	Train B Reactor Trip Switchgear Cabinet
14SBS16BA	3804	AELI0504A	I	5.2.6	SG D Wide Range Level Indicator at RP118B
14SBS16MA	3804	AELI0517X	I	5.2.6	SG A Narrow Range Level Indicator at RP118B
14SBS16PA	3804	AELI0537X	I	5.2.6	SG C Narrow Range Level Indicator at RP118B
14SBY09FA	3804	SB041	P	5.2.37	120 VAC to Process Protection Rack 4 from NN0414
14SES07BC	3804	SENY0061B	I	5.2.36	Source Range Monitoring
16EJI12BA	3804	EJHCV0607	I	5.2.11	RHR B Heat Exchanger Outlet Flow Control (EJHY0607)
16PGG13DA	3804	PG2001	C	5.2.40	Load Center PG20 Feeder Breaker

Table C-33-3
PFSSD Cables Located in Fire Area C-33

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16PNY02AA	3804	PN410	P	5.2.41	120 VAC Power from PN04 (Hot Side)
16PNY02AB	3804	PN410	P	5.2.41	120 VAC Power from PN04 (Neutral)
16RLY01DA	3804	PN00833	P	5.2.11	120 VAC to ESF Control Panel (RL017/RL018)
16RLY01EA	3804	PN00835	P	5.2.39	120 VAC to Reactor Auxiliary Control Pnl (RL021/RL022)
16RLY01GA	3804	PG020GBR217	P	5.2.3	120 VAC to Turbine Generator & Feedwater Control Panel (RL023/RL024)

5.2.1 Steam Generator Atmospheric Relief Valves

PFSSD requires at least two steam generator atmospheric relief valves (ARVs) be controlled and the other two closed. The ARVs are pneumatically operated using air from the compressed air system (KA) or nitrogen from the nitrogen accumulators. The valves open by pneumatic pressure and close by spring action. The valves are automatically controlled by a pressure transmitter installed on the outlet side of the steam generator. Alternatively, each valve can be controlled manually from the control room or the auxiliary shutdown panel by placing the pressure indicating controller (PIC) in manual.

As discussed in Section 5.2.8, a fire in this area could affect the Train B motor driven auxiliary feedwater pump (MDAFP) and the turbine driven auxiliary feedwater pump (TDAFP). Therefore, only the Train A MDAFP is available to feed steam generators B and C. Consequently, steam generator ARVs ABPV0001 and ABPV0004 need to be isolated and steam generator ARVs ABPV0002 and ABPV0003 need to be controlled.

Cables associated with steam generator ARV ABPV0004 are run in area C-33. Damage to these cables could prevent isolating ABPV0004 from the control room. Because of the fail-close design of the valve, it is unlikely that spurious signals due to cable damage will cause the valve to open. However, in the unlikely event the valve opens, an operator can close it using the associated PIC (ABPIC0004B) at the auxiliary shutdown panel (RP118B). Cables for the remaining ARVs are not run in area C-33 and, therefore, the PFSSD function for controlling two steam generators is satisfied.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

Based on the above discussion, steam generator atmospheric relief valve control can be achieved.

References: E-15000, XX-E-013, E-13AB20B, E-1F9101, M-12AB01

5.2.2 Safety Injection and Containment Spray

A spurious safety injection signal (SIS) could cause the safety injection pumps to operate. A spurious containment spray actuation signal (CSAS) could cause the containment spray pumps to operate, depleting inventory in the RWST. These conditions are not desirable for PFSSD at Wolf Creek.

1. Two out of three high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935 and GNPT0936.
2. Two out of four low pressurizer pressures monitored by pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458.
3. Two out of three low steam line pressures on any steam generator monitored by ABPT0514, ABPT0515 and ABPT0516 on SG A; ABPT0524, ABPT0525 and ABPT0526 on SG B; ABPT0534, ABPT0535 and ABPT0536 on SG C; and ABPT0544, ABPT0545 and ABPT0546 on SG D. Two out of three logic must be satisfied on a single steam generator line. Low pressure on a single pressure transmitter co-incident with low pressure on another pressure transmitter on a different steam generator line will not initiate SIS.

Containment spray (CS) is initiated automatically by two out of four high containment pressures monitored by pressure transmitters GNPT0934, GNPT0935, GNPT0936 and GNPT0937.

A cable associated with containment pressure transmitter GNPT0934 is run in area C-33. Cables associated with the remaining containment pressure transmitters are not run in area C-

33. Therefore, a spurious CSAS cannot occur due to a fire in this area. Also, a spurious SIS due to high containment pressure cannot occur.

A cable associated with pressurizer pressure transmitter BBPT0458 is run in area C-33. Cables associated with the remaining pressurizer pressure transmitters do not run in area C-33. Consequently, a fire in area C-33 cannot cause a spurious SIS due to low pressurizer pressure.

Cables associated with steam line pressure transmitters ABPT0516 and ABPT0546 are run in area C-33. Cables associated with the remaining steamline pressure transmitters do not run in area C-33. Consequently, a spurious two out of three logic for low steam line pressure initiation of SIS cannot be satisfied if a fire occurs in area C-33.

Based on the above discussion, a spurious SIS and CSAS cannot occur if a fire occurs in this area.

References: E-15000, XX-E-013, E-13AB21, E-13BB16, E-13GN05, E-1F9431, E-1F9432, E-1F9433, M-12AB01, M-12BB02, M-12GN01

5.2.3 Main Steam Isolation Valves Downstream Components

Cables for several main steam (AB) valves located downstream of the main steam isolation valves (MSIVs) are located in this area. These valves are used for PFSSD to isolate the main steam lines in the event the MSIVs or MSIV bypass valves fail to close. Damage to these cables could cause the associated component to fail open.

Cable 16RLY01GA supplies 120 VAC power to control room panel RL023/RL024. At RL023/RL024, the power is split and supplies power to FCHV0103, ABLV0050 and ABLV0052, as well as other non-PFSSD components. These components are required to be functional for PFSSD in the event the MSIVs and MSIV bypass valves cannot be isolated. Loss of power will cause the valves to remain open.

As discussed in Sections 5.2.4 and 5.2.5, the MSIVs and the MSIV bypass valves can be isolated using hand switch ABHS0080 if a fire occurs in area C-33. Therefore, these downstream valves can fail open with no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-13AB08, E-13AB11A, E-13AB11B, E-13AB11C, E-13RL01, E-13RL07, E-1F9103, E-1F9424E, M-12AB03

5.2.4 Main Steam Isolation Bypass Valves

Each of the four MSIV bypass valves (ABHV0012, ABHV0015, ABHV0018 and ABHV0021) has two redundant solenoids that control the position of the associated valve. The bypass valves are normally closed with the solenoids de-energized. Both solenoids need to be energized to open the valve. One of the solenoids on each valve is on separation group 1 (Train A) and is controlled by hand switch ABHS0080. The other solenoids on each valve are on separation group 4 (Train B) and are controlled by hand switch ABHS0079.

Cable 14ABK23FE is associated with steam line isolation signal relay K627. Upon receipt of a steam line isolation signal, the relay contact opens and the bypass valves close. An open circuit in one of the two conductors will produce the same result as a steam line isolation signal, which is desired for PFSSD. A hot short between the conductors will bypass the contact and prevent a steam line isolation signal from closing the valves.

Cable 14ABK23FF is associated with hand switch ABHS0079 on the Train B MSIV bypass valve control circuit. An open circuit in one of the two conductors will de-energize the respective solenoid and close the bypass valves. A hot short between the conductors will bypass the handswitch contact and prevent closure of the valves using the handswitch.

Cable 14ABK23FG is associated with reset switch ABHS0100 on the Train B MSIV bypass valve control circuit. An open circuit will have no impact on the ability to close the bypass valves. A hot short between the conductors will act as a reset signal and maintain the auxiliary relay energized, maintaining the four Train B bypass valve solenoids energized and therefore providing the Train B permissive to open the valves.

Redundant means are available to ensure the MSIV bypass valves are closed. Hand switch ABHS0080 is unaffected by the fire and can be used to ensure one of the two solenoids on each bypass valve are de-energized.

References: E-15000, XX-E-013, E-13AB23B, E-1F9101, M-12AB02

5.2.5 Steam Generator Main Steam Isolation Valves (MSIVs)

PFSSD requires the MSIVs be closed to prevent reactivity addition due to uncontrolled cooldown. The MSIVs are closed from the control room using all close hand switches ABHS0079 or ABHS0080.

Each MSIV is designed to utilize system fluid (main steam) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main steam. This is done by actuating either all close hand switch ABHS0079 (separation group 4) or ABHS0080 (separation group 1) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MSIV	ABHS0079 (Sep Group 4)		ABHS0080 (Sep Group 1)	
	Solenoids	Cable	Solenoids	Cable
ABHV0011	MV2, MV4, MV6	14ABK28BH	MV1, MV3, MV5	11ABK29BH
ABHV0014	MV2, MV4, MV6	14ABK29AH	MV1, MV3, MV5	11ABK28AH
ABHV0017	MV2, MV4, MV6	14ABK28AH	MV1, MV3, MV5	11ABK29AH
ABHV0020	MV2, MV4, MV6	14ABK29BH	MV1, MV3, MV5	11ABK28BH

All 4 cables associated with the 12 separation group 4 solenoid valves are run in area C-33. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 1 cables associated with hand switch ABHS0080 are unaffected by a fire in area C-33. Therefore, hand switch ABHS0080 is available to close the four MSIVs.

Cable 14ABK30BB provides 125 VDC power to Train B main steam and feedwater isolation actuation system (MSFIS) cabinet SA075B from NK5423. Damage to this cable would disrupt power to the separation group 4 solenoids and close the MSIVs, which is the desired PFSSD position. In addition, the Train A MSFIS is unaffected by the fire and ABHS0080 is available to close the MSIVs.

Based on the above discussion, hand switch ABHS0080 is available to close the MSIVs in the event of a fire in area C-33.

References: E-15000, XX-E-013, E-13AB27, E-13AB28, E-13AB29, E-13AB30, E-1F9101, M-12AB02

5.2.6 Steam Generator Level Indication

The decay heat removal function for PFSSD requires the use of two RCS loops and two Steam Generators. Steam generator (SG) level indication is required to support this function. A fire in area C-33 uses MDAFP A to supply SGs B and C. Therefore, level indication on steam generators B and C is required.

Cables associated with SGs B and C level transmitters AELT0527 (SGB NR) and AELT0537 (SGC NR) run in this area. Cables associated with the remaining level transmitters on steam generators B and C do not run in this area. Therefore, level indication will be available on steam generators B and C using the following level transmitters:

Steam Generator	Available Level Indication
B	AELI0502 (WR), AELI0528 (NR), AELI0529 (NR), AELI0552 (NR)
C	AELI0503 (WR), AELI0538 (NR), AELI0539 (NR), AELI0553 (NR)

Circuits associated with steam generator level indication at the auxiliary shutdown panel (RP118B) are run in area C-33. Damage to these circuit will affect AELI0504A (SG D Wide Range Level Indicator at RP118B), AELI0517X (SG A Narrow Range Level Indicator at RP118B) and AELI0537X (SG C Narrow Range Level Indicator at RP118B). Damage to these circuits will not impact the redundant level indicators in the main control room.

Based on the above discussion, steam generator B and C level indication is assured if a fire occurs in area C-33.

References: E-15000, XX-E-013, E-13AE08, E-13SB16, E-1F9203, M-12AE02

5.2.7 Steam Generator Main Feedwater Isolation Valves

PFSSD requires that either the main feedwater isolation valves (MFIVs) be closed, or the main feedwater pumps be stopped to prevent overfilling the steam generators. Flow diversion from auxiliary feedwater (AFW) to the main feedwater system piping is prevented by check valves AEV0420, AEV0421, AEV0422 and AEV0423. Closure of the main feedwater isolation valves is not required to prevent AFW flow diversion.

Each MFIV is designed to utilize system fluid (feedwater) as the motive force to open and close. The valve actuation (open or close) is accomplished through positioning a series of six electric solenoid pilot valves to either direct the system fluid to the Upper Piston Chamber (UPC) and/or the Lower Piston Chamber (LPC), or vent either or both piston chambers. The six solenoid pilot valves are divided into two trains (3 per train) that are independently powered and controlled. Either train can independently perform the PFSSD function to close the valve and isolate main feedwater. This is done by actuating either all close hand switch AEHS0080 (separation group 1) or AEHS0081 (separation group 4) to de-energize the associated solenoid valves.

The following table identifies the solenoids and associated control cables for each hand switch.

MFIV	AEHS0080 (Sep Group 1)		AEHS0081 (Sep Group 4)	
	Solenoids	Cable	Solenoids	Cable
AEFV0039	MV1, MV3, MV5	11AEK16AH	MV2, MV4, MV6	14AEK17AH
AEFV0040	MV1, MV3, MV5	11AEK17AH	MV2, MV4, MV6	14AEK16AH
AEFV0041	MV1, MV3, MV5	11AEK16BH	MV2, MV4, MV6	14AEK17BH
AEFV0042	MV1, MV3, MV5	11AEK17BH	MV2, MV4, MV6	14AEK16BH

All 4 cables associated with the 12 separation group 4 solenoid valves are run in area C-33. Cable damage due to a fire will likely result in disruption of power to the solenoids, which will close the valves. The four separation group 4 cables associated with hand switch AEHS0080 are unaffected by a fire in area C-33. Therefore, hand switch AEHS0080 is available to close the four MFIVs.

Cable 14ABK30BB provides 125 VDC power to Train B main steam and feedwater isolation actuation system (MSFIS) cabinet SA075B from NK5423. Damage to this cable would disrupt power to the separation group 4 solenoids and close the MFIVs, which is the desired PFSSD position. In addition, the Train A MSFIS is unaffected by the fire and AEHS0080 is available to close the MFIVs.

Based on the above discussion, MFIV isolation is assured using hand switch AEHS0080.

References: E-15000, XX-E-013, E-13AB30, E-13AE14, E-13AE15, E-13AE16, E-13AE17, E-1F9201, J-104-00296, M-12AE02, M-630-00044

5.2.8 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire AFW demand to achieve cold shutdown.

Motor operated valves (MOVs) in the system allow operators to line up the auxiliary feedwater system as required to achieve and maintain safe shutdown. Damage to the MOV circuits due to a fire could prevent operators from lining up the system from the control room.

Several PFSSD cables associated with various components of the auxiliary feedwater system (AL) run through fire area C-33. These cables are identified in Table C-33-3. Damage to these cables could prevent operation of the TDAFP and the Train B MDAFP. In addition, motor operated valves in the flowpath from the Train B MDAFP to steam generators A and D and from the TDAFP to steam generators B and C could spuriously close. Cables associated with the Train A MDAFP, as well as the suction and discharge valves, are unaffected by a fire in this area.

Panels SA036A, SA036B and SA036C monitor pressure transmitter signals on ALPT0037, ALPT0039 and ALPT0038, respectively. A spurious low CST pressure due to fire damage to cables associated with two of these pressure transmitters could swap the water source to ESW. This is only a commercial concern and should be prevented if possible. An instrument cable associated with ALPT0039 runs in this area. Damage to this cable could cause a spurious low CST pressure signal but will not initiate swapover to the ESW system since cables for the remaining two pressure transmitters are unaffected.

Power cables associated with SA036B are run in this area. Damage to these cables could result in a loss of power to the panel but panels SA036A and SA036C remain available. Therefore, automatic operation of low suction pressure (LSP) swapover is available.

Based on the above discussion, auxiliary feedwater is assured if a fire occurs in area C-33 using Train A MDAFP supplying auxiliary feedwater to steam generators B and C.

References: E-15000, XX-E-013, E-13AL01A, E-13AL01B, E-13AL02B, E-13AL03A, E-13AL03B, E-13AL04B, E-13AL05A, E-13AL05B, E-13AL07B, E-13AL08, E-13AL09, E-13SA21, E-1F9202, E-1F9203, E-1F9204, E-1F9402A, E-1F9402B, J-10SA, M-12AL01

5.2.9 Reactor Coolant Pump (RCP) Seal Injection

PFSSD requires RCP seal injection to provide a boron injection path, provide makeup to the RCS and provide cooling to the RCP seals. The redundant boron injection and makeup path is through the boron injection tank (BIT). The redundant seal cooling method uses thermal barrier cooling.

A fire in area C-33 could damage power and control cables associated with all four RCP seal injection valves (BBHV8351A, BBHV8351B, BBHV8351C and BBHV8351D). The seal injection valves are normally open and de-energized with the circuit breaker maintained in the OFF position. The valves are not high/low pressure interface valves so three-phase hot shorts do not have to be considered and, consequently, damage to the power cables will not cause the valves to spuriously close. Damage to the control cables will not cause the valves to close because the power and control circuits are de-energized. Therefore, a fire in this area will not cause the seal injection valves to close.

Cable 14BGG52BC is associated with centrifugal charging pump (CCP) B to RCP seal injection valve BGHV8357B. Redundant Train A CCP to RCP seal injection valve BGHV8357A is unaffected.

Cable 14BGI51BA is associated with RCP seal total flow transmitter BGFT0215B. Damage to this cable could cause a loss of seal flow indication on BGFI0215B. RCP seal total flow indicator BGFI0215A is unaffected by a fire in area C-33 and can be used to diagnose a loss of RCP seal injection.

Based on the above discussion, RCP seal injection may be lost, but alternative means exist to ensure boration, inventory control, and RCP seal integrity. RCP seal total flow indicator BGFI0215A can be used to diagnose a loss of RCP seal injection in the event of a loss of the operating charging pump.

References: E-15000, XX-E-013, E-13BB04, E-13BG51, E-13BG52, E-1F9102, E-1F9302, E-1F9303, M-12BB03, M-12BG03

5.2.10 Component Cooling Water

For PFSSD, the component cooling water (CCW) system is used to provide cooling to the centrifugal charging pump (CCP) oil cooler, seal water heat exchanger, the RHR heat exchanger and the RHR pump seal cooler. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Cables associated with components on the Train B CCW system run through area C-33. Damage to these cables due to a fire could prevent operation of the associated equipment and prevent operation of Train B CCW. Cables associated with redundant Train A CCW are run in a different fire area and are unaffected by the fire.

To ensure an operable flow path from CCW to the RCP thermal barriers, either valves EGHV0071 or EGHV0126 must be open and either EGHV0058 or EGHV0127 must be open. In addition, either valves EGHV0062 or EGHV0132 must be open and either EGHV0061 or EGHV0133 must be open. Also, when operating the Train A CCW system, valve EGHV0015 needs to be open to ensure a return flow path to the suction side of the CCW pumps and EGHV0053 needs to be open to ensure CCW flow to the service loop.

Cables associated with valves EGHV0062, EGHV0071, EGHV0127 and EGHV0133 run through area C-33. If the fire affects cables associated with EGHV0062 and EGHV0071, the valves may spuriously close. If this occurs, Operators could open valves EGHV0132 and EGHV0126 using associated hand switches EGHIS0132 and EGHIS0126 on RL020.

If the Train B CCW system is operating at the time of the fire, operators may need to swap to Train A CCW using hand switches in the control room. If the Train A CCW system is operating at the time of the fire, the CCW system is in the protected lineup except that EGHV0126 and/or EGHV0132 may need to be opened from the control room.

Cable 14EGI19BB is associated with CCW to RCP flow transmitter EGFT0129. Damage to this cable could prevent operators from diagnosing a loss of CCW flow to the RCP thermal barriers using flow indicator EGFI0129. CCW to RCP flow indicator EGFI0128 is unaffected by a fire in area C-33 and can be used to diagnose a loss of CCW flow to the RCP thermal barriers.

Based on the above discussion, Train A CCW is available to provide cooling to essential PFSSD components as well as provide cooling to the RCP thermal barriers. Loss of CCW flow to the RCP thermal barriers can be diagnosed using flow indicator EGFI0128.

References: E-15000, XX-E-013, E-13EG01C, E-13EG01D, E-13EG05A, E-13EG05B, E-13EG09, E-13EG10, E-13EG13, E-13EG15, E-13EG16, E-13EG18, E-13EG18A, E-13EG19, E-1F9303, E-1F9401A, E-1F9401B, M-12EG01, M-12EG02, M-12EG03

5.2.11 Residual Heat Removal (RHR)

PFSSD requires one train of residual heat removal (RHR) to be available for shutdown cooling. The RHR system is not used for hot standby.

Hot shutdown requires isolation of the RCS to RHR flow path by maintaining either BBPV8702A or EJHV8701A closed and either BBPV8702B or EJHV8701B closed. Cold shutdown requires RHR taking suction from the RCS. RHR pump suction from the RCS is controlled by valves BBPV8702A and EJHV8701A (Train A) and BBPV8702B and EJHV8701B (Train B). The PFSSD methodology credits Train A RHR to achieve cold shutdown if a fire occurs in area C-33.

A control cable associated with RHR pump B (PEJ01B) could be damaged, causing a spurious pump start or preventing the pump from being started. Cables associated with RHR pump A are unaffected by a fire in area C-33.

Cables 14BBG12AF and 14BBG12AG are control cables associated with BBPV8702A. An inter-cable (cable-to-cable) hot short between cables 14BBG12AF and 14BBG12AG will bypass the control room hand switch and provide the permissive to open BBPV8702A. Valve EJHV8701A will remain closed since cables associated with this valve are not run through area C-33. Furthermore, BBPV8702A and EJHV8701A are administratively maintained closed with the breaker locked open. The 3-phase power cables associated with both valves are not run in this area, so a 3-phase hot short is not credible.

Cables 14BBG12BF and 14BBG12BG are control cables associated with BBPV8702B. An inter-cable (cable-to-cable) hot short between cables 14BBG12BF and 14BBG12BG will bypass the control room hand switch and provide the permissive to open BBPV8702B. Valve EJHV8701B will remain closed since cables associated with this valve are not run through area C-33. Furthermore, BBPV8702B and EJHV8701B are administratively maintained closed with the breaker locked open. The 3-phase power cables associated with both valves are not run in this area, so a 3-phase hot short is not credible.

An open circuit in cable 14BBG12AF could prevent remote opening of valve BBPV8702A when transitioning to RHR Train A. If this occurs, a cold shutdown repair or a containment entry will be necessary to open the valve. Valve EJHV8701B can be controlled from the control room.

Valve EGHV0101 is the Train A CCW to RHR Heat Exchanger control valve. Valve EGHV0102 is the Train B CCW to RHR Heat Exchanger control valve. These valves are normally closed during power operation. PFSSD requires that the valve on the operating train of CCW be closed until shutdown cooling mode is entered, at which time the valve on the operating train of RHR needs to be open. As stated in Section 5.2.10, the Train B CCW system may not be available to supply cooling water to the Train B RHR heat exchanger. Cable 14EGG07BC is associated with valve EGHV0102. Damage to the cable could prevent operation of EGHV0102 and could cause the valve to spuriously open. Valve EGHV0101 is unaffected by a fire in this area.

When RHR pumps are operating, the associated mini-flow valve (EJFCV0610 or EJFCV0611) needs to be controlled. The mini-flow valves prevent RHR pump overheating by re-circulating water from the discharge side of the RHR heat exchanger to the suction side of the RHR pump. The mini-flow valve opens when the flow indicator measures low flow and closes on high flow. Damage to cable 14EJG08BC could prevent mini-flow valve EJFCV0611 from operating properly. If the Train B RHR pump spuriously starts and EJFCV0611 fails to operate, the pump could be damaged. This is a commercial concern only since Train A RHR pump and mini-flow valve EJFCV0610 are unaffected by a fire in this area.

The RHR heat exchanger discharge control valve on the operating train (EJHCV0606 (Train A) or EJHCV0607 (Train B)) needs to be available. Cable 16EJI12BA, which is associated with EJHCV0607, runs through area C-33. Cable 16RLY01DA provides 120 VAC power to RL017/RL018 (EJHY0607) from PN0833. Damage to these cables could result in a loss of valve EJHCV0607. Valve EJHCV0606 is unaffected by a fire in this area.

RHR pump A discharge to CVCS control valve EJHV8804A needs to be closed when operating the Train A RHR system. RHR pump B discharge to SI Pump B control valve EJHV8804B needs to be closed when operating the Train B RHR system. Damage to cable 14EJG04BC could cause valve EJHV8804B to spuriously open. The Train A RHR system is credited for a fire in this area so spurious opening of EJHV8804B will have no adverse impact on PFSSD. Cables associated with EJHV8804A do not run in area C-33.

Cables associated with Train B RHR pump discharge to RCS cold leg isolation valve EJHV8809B run in area C-33. Damage to these cables could prevent operating the valve from the control room. Cables associated with Train A RHR pump discharge to RCS cold leg isolation valve EJHV8809A do not run in area C-33. Consequently, valve EJHV8809A is unaffected by a fire in area C-33.

The cold shutdown mode of PFSSD requires isolation of hot leg recirculation. Valve EJHV8840 is used to isolate RHR flow to the RCS hot leg loops 2 and 3. This valve is normally closed and is required to be closed for cold shutdown. During hot standby, the valve can be in any position. Cables associated with valve EJHV8840 run through area C-33. Damage to cables 14EJG09AC and 14EJG09AD would likely result in valve EJHV8840 remaining in its as-is normally closed position, which is the preferred PFSSD position. However, two proper intra-cable hot shorts in cable 14EJG09AD or one intra-cable hot short in cable 14EJG09AD combined with a short to ground on conductor U1 would spuriously open the valve.

As stated above, the position of valve EJHV8840 (open or closed) will not affect hot standby. The valve needs to be closed for cold shutdown. The valve has been modified to address NRC IN 92-18 and can be closed manually prior to entering shutdown cooling mode. The torque and limit switches are not bypassed by postulated damage to these cables.

Based on the above discussion, the Train B RHR system could be affected by a fire in this area but the Train A RHR system is available. Valve BBPV8702A may need to be manually opened and valve EJHV8840 may need to be manually closed when transitioning to Train A RHR for shutdown cooling.

References: E-15000, XX-E-013, E-13BB12A, E-13BB12B, E-13EJ01, E-13EJ04B, E-13EJ08, E-13EJ09A, E-13EJ12, E-13RL01, E-13RL04, E-1F9205, E-1F9301, E-1F9401A, E-1F9421, M-12BB01, M-12EJ01

5.2.12 Pressurizer Power Operated Relief Valves and Associated Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed. Cables and components associated with PORV BBPCV0456A and associated block valve BBHV8000B are run through area C-33. Cables and components associated with PORV BBPCV0455A and associated block valve BBHV8000A are not located in area C-33.

The pressurizer PORVs are not considered high/low pressure interfaces. The valves are supplied power by an ungrounded 125 VDC system. Therefore, based on GL 86-10, consideration of multiple proper polarity hot shorts is not required. A single proper polarity hot short still needs to be considered.

In the event a fire causes BBPCV0456A to open and damages BBHV8000B cables, Operators can close BBPCV0456A by placing hand switch BBHIS0456A, located on RL021, in the close position. Pressurizer level and RCS pressure indication are available to diagnose a failed open PORV using BBLI0459A and BBPI0405, respectively. In addition, pressurizer pressure indication is available using BBPI0455A, BBPI0456 and BBPI0457.

An instrument cable (14BBI16NB) associated with pressurizer pressure transmitter BBPT0458 is run in fire area C-33. Damage to this cable could send a spurious high-pressure signal to the pressure control system. However, as discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure channel will not cause the spurious operation of the pressurizer PORVs.

Based on the above discussion, pressurizer PORV BBPCV0456A could spuriously open due to damage to the PORV control cables and block valve BBHV8000B may not close due to cable damage. The PORV can be closed using hand switch BBHIS0456A in the main control room.

References: XX-E-013, E-15000, M-12BB02, E-13BB39, E-13BB40, E-13BB16, E-1F9301, CR13079, DCP 12944, DCP 13324

5.2.13 Reactor Coolant System (RCS) Pressure Indication

The PFSSD design requires RCS pressure indication to be available. RCS pressure indication is provided in the control room using BBPI0405 or BBPI0406. A cable (14BBI16BB) associated with pressure transmitter BBPT0406 is located in fire area C-33. Damage to this cable could prevent RCS pressure indication on BBPI0406.

Cables associated with redundant RCS pressure transmitter BBPT0405 are unaffected by a fire in this area. Therefore, RCS pressure indication is available using BBPI0405.

Based on the above discussion, RCS pressure indication is available in the control room using BBPI0405 if a fire occurs in area C-33.

References: E-15000, XX-E-013, E-13BB16, E-1F9201, E-1F9205, M-12BB04

5.2.14 Reactor Head Vent Valves

PFSSD requires that one of the two reactor vessel head vent valves on each flow path (2 flow paths total) be closed to prevent uncontrolled depressurization of the RCS. Either BBHV8001A or BBHV8002A and either BBHV8001B or BBHV8002B needs to be closed.

A cable (14BBK30DA) associated with one of the four head vent valves (BBHV8002B) runs through area C-33. Cables for remaining head vent valves BBHV8001A, BBHV8002A and BBHV8001B are not run through C-33 and are unaffected by the fire. Therefore, at least one valve on each flow path can be controlled and spurious opening of BBHV8002B will have no adverse impact on PFSSD.

References: E-15000, XX-E-013, E-13BB30, E-1F9301, M-12BB04

5.2.15 Centrifugal Charging Pumps

A control cable associated with Train B Centrifugal Charging Pump (CCP) PBG05B runs through area C-33. Damage to this cable could prevent operation of the pump. Redundant Train A CCP cables are run in a separate fire area and are unaffected by a fire.

Control cables associated with Train B charging pump miniflow valve BGHV8111 are run through area C-33. Redundant Train A cables for miniflow valve BGHV8110 are run in a different area and are unaffected by a fire in area C-33.

Cables associated with RWST to charging pump B control valve BNLCV0112E are run in this area. Damage to these cables could prevent opening or cause spurious closure of the valve. Redundant valve BNLCV0112D is unaffected by a fire in area C-33.

Based on the above discussion, the Train A CCP is available if a fire occurs in area C-33.

References: XX-E-013, E-15000, E-13BG01A, E-13BG11C, E-13BN01A, E-1F9102, E-1F9302, E-1F9401A, M-12BG03, M-12BN01

5.2.16 Charging Flow to Regenerative Heat Exchanger Isolation Valves

PFSSD requires charging flow to be directed to the RCS through the RCP seals and/or the boron injection tank. To ensure adequate flow to the RCS, flow diversion to the regenerative heat exchanger needs to be prevented. Valves BGHV8105 and BGHV8106 are included in the PFSSD equipment list to accomplish this task. Manual valve BG8402B is also included to provide an alternate means of closing this flow path during alternate safe shutdown using OFN-RP-017.

A control cable associated with BGHV8105 is run in area C-33 and could be damaged by a fire, preventing valve BGHV8105 from being closed from the control room. Cables associated with valve BGHV8106, and its hand switch (BGHIS8106), are unaffected by a fire in area C-33. Therefore, valve BGHV8106 is available to isolate flow to the regenerative heat exchanger.

References: E-15000, XX-E-013, E-13BG11A, E-1F9102, E-1F9302, M-12BG03

5.2.17 Volume Control Tank (VCT) Discharge Valves

PFSSD requires isolation of the Volume Control Tank (VCT) discharge to charging pumps suction using either valve BGLCV0112B or BGLCV0112C. Cables associated with BGLCV0112C are run in area C-33. Damage to these cables could prevent closing this valve from the control room. Cables associated with BGLCV0112B are unaffected by a fire in this area.

Cable 14BGI51DA is an instrumentation cable for VCT level transmitter BGLT0185. Damage to this cable could send a false VCT low-low level signal and close relay K647 on the close circuit for valve BGLCV0112C. This would fail the valve closed if all other permissives are met, which is the desired PFSSD position. Therefore, damage to this cable will have no adverse impact on the ability to isolate the VCT discharge flow path.

Based on the above discussion, valve BGLCV0112B can be isolated using BGHIS0112B in the main control room.

References: E-15000, XX-E-013, E-13BG12A, E-13BG51, E-1F9102, E-1F9302, M-12BG03

5.2.18 Excess Letdown

The excess letdown flowpath is required to be isolated to prevent uncontrolled depressurization of the RCS. Therefore, either normally closed valve BGHV8153A or BGHV8154A must be maintained closed and either normally closed valve BGHV8153B or BGHV8154B must be maintained closed.

One cable associated with BGHV8154B runs through fire area C-33. Therefore, the remaining valves are unaffected by a fire in area C-33 and will remain closed.

References: E-15000, XX-E-013, E-1F9301, E-13BG48, M-12BG01

5.2.19 Steam Generator Blowdown to Blowdown Flash Tank Isolation Valves

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown. Cables associated with these valves are run in area C-33. An open circuit in these cables will fail the valves closed, which is the desired PFSSD position. A hot short on these cables could prevent the valves from being closed using hand switches BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A in the main control room.

Redundant capability exists for closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004. The redundant means uses BMHIS0001C, BMHIS0002C, BMHIS0003C and BMHIS0004C, located on the BM157 panel in the radwaste control room. Access is available without traversing area C-33.

Although the configuration is not in literal compliance with 10CFR50, Appendix R, feasible manual actions are available and are unaffected by the fire.

Thermal hydraulic analysis WCNOC-CP-002 shows insignificant impact on SG inventory even with all four blowdown valves open. Therefore, no E-1F9900 OMA is required to close blowdown valves to achieve and maintain hot standby. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 34.

References: E-15000, XX-E-013, E-13BM06A, E-1F9101, M-12BM01

5.2.20 Refueling Water Storage Tank (RWST) and Containment Sump Isolation Valves

To prevent draindown of the RWST into the containment sump, PFSSD requires that either valve BNHV8812A or valve EJHV8811A and valve BNHV8812B or valve EJHV8811B be closed during hot standby. For cold shutdown, the operating train containment sump valve (EJHV8811A or EJHV8811B) must be maintained closed to prevent flow diversion from the RCS to the containment sump. Valves BNHV8812A and BNHV8812B are normally open and valves EJHV8811A and EJHV8811B are normally closed.

Cable 14BNG03BC, associated with valve BNHV8812B, runs through area C-33. Damage to this cable could prevent closure of the valve from the control room and could prevent automatic closure when valve EJHV8811B is fully open.

A control cable (14EJG06BC) associated with valve EJHV8811B runs through fire area C-33. Damage to this cable will not result in valve EJHV8811B opening as long as valve BNHV8812B remains open. If valve BNHV8812B is fully closed, it will provide a permissive for valve EJHV8811B to open. If valve EJHV8811B opens due to damage to cable 14EJG06BC, draindown will not occur since valve BNHV8812B is closed.

Cable 14BNI07FA, associated with RWST level transmitter BNLT0933, is run in area C-33. Circuits for the remaining three RWST level transmitters are not run in area C-33. Therefore, RWST level indication is available using BNLI0930, BNLI0931 and BNLI0932.

Based on the above discussion, draindown of the RWST to the containment sump is not credible if a fire occurs in area C-33.

References: E-15000, XX-E-013, E-13BN03A, E-13EJ06B, E-13BN07, E-1F9102, E-1F9204, E-1F9205, M-12BN01, M-12EJ01, M-10BN

5.2.21 Essential Service Water

Either the Train A or the Train B essential service water (ESW) system is required to be available to ensure PFSSD. The ESW system supplies water to the following PFSSD components on the associated train:

- CCP room cooler
- RHR pump room cooler
- Class 1E switchgear room A/C condenser
- diesel generator engine cooling
- control room A/C condenser
- auxiliary feedwater pump room cooler
- motor and turbine driven auxiliary feedwater pump suction (backup to CST)
- containment air coolers
- electrical penetration room cooler
- component cooling water pump room cooler
- component cooling water heat exchanger
- component cooling water system makeup

A number of components associated with Train B ESW system could be affected by a fire in this area. The Train B ESW pump and a number of Train B ESW control valves could spuriously operate or may not operate when required. The Train B ESW pump room supply fan and associated dampers may not operate. Therefore, the Train B ESW system cannot be relied on if a fire occurs in this area.

The service water system provides the normal source of water to the ESW piping. Service water supply to and return from the ESW piping is each controlled by two valves installed in series. One of the two valves on each leg is required to be closed for PFSSD to prevent flow diversion from the credited ESW system. As discussed in the previous paragraph, the Train B ESW system may not be available if a fire occurs in this area. One valve (EFHV0025) on the Train A service water to ESW piping supply line and one valve (EFHV0039) on the Train A ESW to service water return line may be affected by the fire and may not close on a signal from the control room. Redundant valves EFHV0023 and EFHV0041 are unaffected by the fire and will close on a signal from the control room. Therefore, the ESW/service water cross connects can be isolated if a fire occurs in this area. In addition, check valve EFV0470 is installed between valves EFHV0023 and EFHV0025 and will prevent flow diversion from Train A ESW to the service water system. Also, check valve EFV0471 is installed between valves EFHV0024 and EFHV0026 and will prevent flow diversion from Train B ESW to the service water system.

Cable 14RPY10BA supplies 120 VAC control power to the automatic and manual start circuits for the Train B ESW pump room supply fan CGD01B. The control power is supplied via this cable to control room panel RP068. If power is lost due to damage to this cable, then the Train B ESW pump room supply fan will not start either automatically, when the ESW pump starts, or manually from the control room. If this occurs, the Train A ESW pump room supply fan remains unaffected by the fire.

Cables 14GDY01BA, 14GDY01BB and 14GDY01BD are associated with Train B ESW pump room supply fan CGD01B. Damage to these cables could prevent operation of the supply fan. Train A ESW pump room supply fan CGD01A is unaffected by a fire in this area.

The Train A ESW system is unaffected by a fire in area C-33 and ESW remains available in the event of a fire in this area.

References: E-15000, XX-E-013, E-13EF02, E-13EF02A, E-13EF03, E-13EF04, E-13EF05, E-13EF06A, E-13EF07A, E-13EF08A, E-13EF09A, E-13EF11, E-13RP10, E-K3EF01A, E-K3EF08, E-K3GD01A, E-K3GD04, E-K3GD04A, J-201-00133, E-

1F9402A, E-1F9402B, E-1F9403, E-1F9424B, E-1F9443, M-12EF01, M-12EF02, M-K2EF01, M-K2GD01

5.2.22 Safety Injection (SI) Pumps

The preferred PFSSD condition of the SI pumps is off. Therefore, a spurious start of the SI pumps should be avoided or mitigated. A control cable (14EMB01BB) associated with Train B SI pump PEM01B runs through area C-33 and could cause a spurious start of the pump and prevent stopping the pump from the control room.

If the Train B SI pump spuriously starts with the reactor at normal pressure, PFSSD will be assured. The pump will not discharge into the RCS due to the pressure differential between the RCS (approximately 2,235 psig) and the SI pump shutoff pressure (approximately 1,565 psig). In addition, the setpoint of the discharge relief valve (EM8853B) to the Recycle Holdup Tank is 1,825 psig. Therefore, no inventory is lost from the RWST if the SI pumps spuriously start. With the SI pump operating with no flow, damage to the pump could occur, which is a commercial concern since the SI pump is not credited in the PFSSD analysis. If necessary, the pump can be stopped by opening breaker NB0202, but this action is not required for PFSSD.

Based on the above discussion, spurious operation of the Train B SI pump will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13EM01, E-1F9102, E-1F9302, M-12EM01, M-721-00096, WCRE-01

5.2.23 Boron Injection Tank Flowpath

The Boron Injection Tank (BIT) flowpath is credited for reactivity control and reactor coolant makeup. For reactivity control, the BIT flowpath is credited as an alternate source of boration in the event RCP seal injection is unavailable. Based on Calculation XX-E-013, RCP seal injection will provide sufficient boration to achieve and maintain cold shutdown reactivity conditions. Therefore, the BIT flowpath is not required for reactivity control if RCP seal injection is available. Since RCP seal injection is limited to 5 gpm per seal or 20 gpm total injection to the RCS, an additional RCS charging flowpath is required for adequate RCS makeup during plant transition from hot standby to cold shutdown. The BIT injection path was selected as the additional RCS charging flowpath.

As discussed in Section 5.2.9, RCP seal injection is available in the event of a fire in area C-33. In addition, the letdown and excess letdown flowpaths can be isolated if a fire occurs in this area. Therefore, boration and inventory control through the BIT is not required to ensure PFSSD.

To prevent CCP flow diversion through the SIS test line when charging through the BIT, valves EMHV8843 and EMHV8882 need to be closed. If either or both of these valves cannot be closed, then closing or maintaining closed either valve EMHV8871 or EMHV8964 will prevent flow in the SIS test line. Cables associated with EMHV8843 and EMHV8871 are run in this area. Damage to these cables could cause the valves to open. Cables associated with EMHV8964 do not run in area C-33. Therefore, valve EMHV8964 can be controlled to prevent flow through the SIS test line when charging through the BIT.

Based on the above discussion, the BIT flowpath is available to provide a charging flowpath using the Train A CCP.

References: E-15000, XX-E-013, E-13EM02A, E-13EM02B, E-13EM02C, E-13EM04, E-13EM04A, E-1F9302, M-12EM01, M-12EM02

5.2.24 Containment Spray (CS) Pumps

Spurious start of the CS pumps may complicate PFSSD due to the possible depletion of inventory in the RWST. Therefore, a spurious start of the CS pumps should be avoided or mitigated. A control cable (14ENB01BB) associated with Train B CS pump PEN01B runs through area C-33 and could cause a spurious start of the pump. The cable damage could prevent stopping the pump from the control room.

Normally closed valve ENHV0012 could open due to damage to associated control cables. If this occurs coincident with a running Train B CS pump, water would flow from the containment spray nozzles, depleting inventory in the RWST.

The total flow in the containment spray system during injection phase with one pump operating is 3,165 gpm (M-10EN). Based on calculation XX-E-013, Appendix 1, a maximum of 214,260 gallons of water can be lost from the RWST to maintain sufficient volume to achieve cold shutdown.

As stated previously, level indication in the RWST is available, so operators have the ability to diagnose a reducing RWST inventory. The time available to mitigate containment spray is:

214,260 gallons / 3,165 gpm = 67.7 minutes

Based on the above discussion, there is 67.7 minutes available to mitigate containment spray. This is an OMA. Refer to E-1F9900 for details. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 16.

References: XX-E-013, E-15000, E-13EN01, E-13EN03, E-1F9102, E-1F9302, E-1F9424B, E-1F9433, M-10EN, M-12EN01

5.2.25 Safety Injection Accumulator Isolation Valves

PFSSD requires isolation of the SI accumulators prior to reducing RCS pressure below the injection pressure to avoid unnecessary accumulator discharge. This is accomplished by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. These valves are normally open with the MCC breaker administratively locked in the open position. Cables for valves EPHV8808B and EPHV8808D are run in area C-33.

Since the breakers for these valves are normally open, damage to these cables will not cause the valves to spuriously change position. However, damage to the cables will prevent closing the associated valve from the control room after power is restored.

The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig. If necessary, a containment entry can be made to manually close the valves.

References: E-15000, XX-E-013, E-13EP02A, E-1F9201, M-12EP01, CKL EP-120

5.2.26 TDAFP Steam Trap Drain Valve

Valve FCFV0310 is an isolation valve on the 1-inch steam trap line associated with the TDAFP. Solenoid valve FCFY0310 controls the position of valve FCFV0310. PFSSD requires this valve to be closed to prevent uncontrolled loss of steam through this flow path.

Cable 14FCK21AA is a control cable associated with valve FCFV0310. Inter or intra-cable hot shorts could cause the valve to spuriously open. There are no energized 125 VDC cables in the same conduit as cable 14FCK21AA, so inter-cable hot shorts causing the valve to open are not possible. An intra-cable hot short from conductor 2 to conductor 1 will energize the solenoid and open the valve. This can be mitigated by depressing the close pushbutton on

hand switch FCHIS0310. However, since this is a momentary contact switch, the operator would have to maintain the button in the depressed position.

Uncontrolled blowdown through this 1-inch line is bounded by the main steam line break analysis and loss of steam through this line will not result in uncontrolled cooldown. Therefore, if the valve remains open, PFSSD is assured.

References: E-15000, XX-E-013, E-13FC21, E-1F9202, M-12FC02

5.2.27 Control Room Air Conditioning

Control room air conditioning is required to be available to satisfy the PFSSD support function. Two redundant and independent air conditioning units (SGK04A and SGK04B) are provided to satisfy this function. At least one unit is required to be available for PFSSD.

Several cables associated with Train B Control Room A/C Unit SGK04B and associated dampers are run in this area. Damage to these cables could prevent operation of the unit.

The Train A control room A/C unit is unaffected by a fire in this area. Therefore, control room air conditioning is available if a fire occurs in area C-33.

References: XX-E-013, E-15000, E-13GK02D, E-13SA20, E-1F9442, M-12GK01, M-622.1A-00007

5.2.28 Class 1E Electrical Equipment Room Air Conditioning

The PFSSD support function requires Class 1E electrical equipment air conditioning on the operating train of equipment. Class 1E electrical equipment air conditioning is provided by units SGK05A (Train A) and SGK05B (Train B).

Cables associated with Train B Class 1E electrical equipment room A/C unit SGK05B are run in area C-33. Damage to these cables could prevent operation of the unit.

Cable 14SAZ20HA provides a control power signal from panel GK196C to status panel SA066B to monitor SGK05B control power. Damage to this cable could prevent operation of SGK05B.

Cables associated with Train A Class 1E electrical equipment room A/C unit SGK05A are unaffected by a fire in this area. Therefore, room cooling for Train A Class 1E electrical equipment remains available.

References: XX-E-013, E-15000, E-13GK13A, E-13SA20, E-1F9444, M-12GK03, M-622.1A-00002

5.2.29 Standby Diesel Generation

Cables associated with the Train B diesel generator are run in this area. Also, cables associated with the Train B diesel generator room exhaust damper GMHZ0019 run in this area. Damage to these cables could prevent operation of the Train B diesel generator.

A fire in area C-33 could cause a loss of several Train B components, however, Train A components are available and are unaffected by the fire. Based on calculation XX-E-013, off-site power is available on Train A if a fire occurs in area C-33. Therefore, neither diesel generator is required if a fire occurs in this area and mal-operation of the Train B diesel generator will have no adverse impact on safe shutdown.

References: XX-E-013, E-15000, E-12KJ01, E-13GM01A, E-13GM04A, E-13JE01, E-13JE04, E-13KJ03A, E-13KJ07, E-13NE11, E-13NE13, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, E-1F9444, M-12GM01, M-12JE01

5.2.30 Containment Coolers

PFSSD requires containment cooling to maintain the containment environment within EQ limits. Cables associated with Train B containment coolers are run in area C-33. Damage to these cables could prevent operation of the Train B containment coolers. Circuits associated with Train A containment coolers are run in a separate fire area and are unaffected by a fire in area C-33.

As discussed earlier, Train A ESW is available if a fire occurs in area C-33. Therefore, the Train A containment coolers will have the necessary service water flow to ensure proper operation.

References: E-15000, XX-E-013, E-13GN02A, E-1F9441, M-12GN01

5.2.31 Class 1E 4.16 kV ESF Switchgear Bus NB01 and NB02

Bus NB02 supplies power to Train B Engineered Safety Features (ESF) components. A fire in area C-33 could damage cables associated with NB02 and disrupt power to all Train B ESF components.

Control cables associated with bus NB02 Synchro-scope and associated switches are run in area C-33. Damage to these cables could prevent some of the monitoring functions for NB02 but would not cause a loss of the NB02 bus.

Redundant Train A ESF components, supplied by NB01, are unaffected by a fire in area C-33. Therefore, loss of power to Train B components due to a fire in area C-33 will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-13NB04, E-13NB05, E-13NB06, E-13NB14, E-13NB15, E-1F9423, E-1F9426, KD-7496

5.2.32 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

Cables 14NFK01CA and 14NFK01DA for one of the four UV relays on each bus are run in fire area C-33. Also, cables 14NFY01EA and 14NFY01FA associated with one of the four degraded voltage PTs on each bus are run in fire area C-33. Cables associated with the remaining three UV relays and PTs do not run in fire area C-33. Therefore, automatic functioning of the bus NB01 and NB02 emergency load shedder / sequencer is unaffected by a

fire in area C-33 and a spurious start of the associated diesel generator due to a false undervoltage condition on two of the four circuits is not credible.

Separation group 4 power cables 14NFY01GA and 14NFY01HA associated with NF039A, NF039B and NF039C are run in this area. Separation groups 1, 2 and 3 power cables associated with these panels are unaffected. Therefore, power to the load shedder/sequencer panels is available.

Based on the above discussion, the Train A and Train B load shedder/sequencers are available if a fire occurs in this area. Off-site power to Train A components is unaffected based on Calculation XX-E-013, Appendix 2.

References: XX-E-013, E-15000, E-11005, E-11NB01, E-11NB02, E-12NF01, E-13NF01, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, E-1F9402A, E-1F9402B, E-1F9403, E-1F9425, E-1F9426

5.2.33 Train B 480 Volt Class 1E Load Centers

Cables associated with Train B 480 VAC Class 1E load centers NG02, NG04 and motor control center (MCC) NG06E are run in area C-33. In addition, as stated in other sections, loss of power to these load centers could occur due to loss of Train B off-site and on-site power. Therefore, Train B load centers and associated equipment may not be available if a fire occurs in this area.

Cable 14PKK11AA is associated with 480 VAC breaker NG0409. NG0409 supplies 480 VAC power to Train B 125 VDC battery charger PK22, which energizes the PK02 bus. Damage to this cable could disable power to the battery charger but will not de-energize PK02 due to the installed batteries. Battery set PK12 will maintain 125 VDC power to PK02. In addition, NG0102 is unaffected and will continue to supply power to Train A 125 VDC battery charger PK21.

Redundant Train A components, supplied by NG01, NG03 and NG05E are unaffected by a fire in area C-33. Therefore, loss of power to Train B 480 VAC Class 1E load centers NG02, NG04 and MCC NG06E will not impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-11NG02, E-13NG01A, E-13NG10A, E-13NG11A, E-13NG11B, E-13PK11, E-K3NG10A, E-1F9411B, E-1F9412B, E-1F9422C, E-1F9423, E-1F9424A. E-1F9424B, E-1F9424C, E-1F9424D

5.2.34 Class 1E 125 VDC Distribution System

Power cables associated with the Class 1E 125 VDC electrical distribution system are run in area C-33. These cables supply 125 VDC power to various PFSSD loads. The cables and supplied PFSSD equipment are summarized in the following table.

CABLE	NK BREAKER	CONTROL PANEL	PFSSD Components
14RLK01AA	NK04407	RL001/002	BGHV8153B, BGHV8154B
14RLK01BA	NK04409	RL005/006	FCFY0310
14RLK01CA	NK04412	RL017/018	EMHV8843, EMHV8871
14RLK01DA	NK04413	RL019/020	EGTV0030, GMHZ0019
14RLK01EA	NK04414	RL021/022	BBHV8001B, BBHV8002B
14RLK01FA	NK04411	RL023/024	BMHV0001, BMHV0002, BMHV0003, BMHV0004

Damage to these cables could cause a loss of power to the associated components. This is acceptable for PFSSD since the components fail in the desired PFSSD position upon loss of power, or the redundant Train A component is available to perform the PFSSD function.

References: XX-E-013, E-15000, E-13BB30, E-13BG48, E-13BM06A, E-13EG16, E-13EM04, E-13EM04A, E-13FC21, E-13GM04A, E-13RL01, E-13RL02, E-13RL03, E-13RL04, E-13RL05, E-13RL06, E-13RL07, E-1F9101, E-1F9202, E-1F9301, E-1F9302, E-1F9401A, E-1F9422B, E-1F9444, M-12BB04, M-12BG01, M-12BM01, M-12EG02, M-12EM01, M-12EM02, M-12FC02, M-12GM01

5.2.35 BOP Instrument Racks

BOP instrument racks RP053A, RP053B, RP053D and RP147 are credited in the PFSSD analysis. The following table identifies the PFSSD components served by each instrument rack.

Instrument Rack	PFSSD Components
RP053A (RP053AA, RP053AB, RP053AC)	ALHV0009, ALHV0011 ALPY0037A, EGFT0128, EGPSL0077, GDTSL0001, JELSL0001C
RP053B (RP053BA, RP053BB, RP053BC)	ALHV0007, ALPY0039A, EGFT0129, EGPSL0078, GDTSL0011, JELSL0021C
RP053D (RP053DA, RP053DB)	ALPY0038A
RP147 (RP147A, RP147B)	ALHV0005

Cables 14RPY09BA and 14RPY09CA supply 120 VAC power to BOP instrument rack RP053B. Damage to these cables could cause a loss of function of panel RP053B and associated PFSSD components. Redundant components are supplied by the remaining BOP instrument racks.

Instrument racks RP053A, RP053D and RP147 are unaffected by the fire. Therefore, loss of PFSSD components associated with RP053B will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13AL08, E-13AL09, E-13EG13, E-13JE01, E-13NN01, E-13RP09, E-1F9101, E-1F9202, E-1F9204, E-1F9401B, E-1F9411B, E-1F9411A, E-1F9424D, E-1F9443, E-K3GD01A, E-K3GD04, M-12AL01, M-12EG01, M-12JE01, M-K2GD01

5.2.36 Source Range Monitoring

PFSSD requires source range (SR) flux monitoring to be available. Source range monitoring is provided by source range monitors SENE0031, SENE0032, SENY0060A & B, and SENY0061A & B.

Cable 14SES07BC is an instrumentation cable associated with SR monitor signal processor SENY0061B. This cable runs from SENY0061B to the source range recorder on RL020. Damage to this cable could prevent operation of the recorder. Source Range monitoring remains available for a fire in area C-33 using SENE0031, SENE0032 and SENY0060A/B and SENY0061A.

For a more detailed evaluation on Source Range monitoring, see Calculation XX-E-013, Attachment 3.

References: E-15000, XX-E-013, E-13SE07, E-1F9101

5.2.37 Reactor Protection System

The Reactor Protection System (RPS) monitors specified input parameters and initiates reactor protection features whenever those parameters are outside specified limits. Field installed transmitters continuously monitor various parameters and report the results to one of four process cabinets, one per channel. Signals are then sent from the process cabinets to both solid state protection cabinets, one on each train. The cabinets and associated channel are listed in the following table:

Process Cabinets	Solid State Protection Cabinets
Cabinet SB038 - Channel 1 Cabinet SB042 - Channel 2 Cabinet SB037 - Channel 3 Cabinet SB041 - Channel 4	Cabinet SB029A - Train A Input Cabinet Cabinet SB029B - Train A Logic Cabinet Cabinet SB029C - Train A Output Cabinet 1 Cabinet SB029D - Train A Output Cabinet 2 Cabinet SB032A - Train B Input Cabinet Cabinet SB032B - Train B Logic Cabinet Cabinet SB032C - Train B Output Cabinet 1 Cabinet SB032D - Train B Output Cabinet 2

The RPS is actuated upon 2/3 or 2/4 coincident logic, depending on the input parameter. This ensures that a loss of a single channel will not prevent the system from performing its function. Loss of power to a single cabinet will render the channel or Train inoperative.

Cables associated with RPS channel 4 run through this area. These cables supply power from separation group 4 power supplies to panels SB029A, SB032A, SB032D and SB041. Power cables associated with RPS channels 1, 2 and 3 are run in a separate fire area.

Based on the above discussion, the reactor protection system is available if a fire occurs in this area.

References: XX-E-013, E-15000, E-11NK02, E-13NN01, E-13SB01, E-13SB02, E-13SB05, E-13SB08A, E-13SB08D, E-13SB09, E-1F9102, E-1F9103, E-1F9203, E-1F9205, E-1F9421, E-1F9433, E-1F9431, E-1F9432, M-761-000167

5.2.38 Reactor Trip Switchgear

The reactor trip switchgear is required to ensure the ability to manually trip the reactor. The reactor is tripped using either hand switch SBHS0001 or SBHS0042 in the main control room. Each hand switch has contacts associated with Train A reactor trip switchgear SB102A and Train B reactor trip switchgear SB102B.

Cable 14SBS12BC, associated with separation group 4 trip circuits, is run in area C-33. A hot short in this cable could cause a spurious reactor trip, which is the desired PFSSD condition. An open circuit will prevent a manual reactor trip on Train B reactor trip switchgear SB102B.

Cables associated with separation group 1 trip circuits are unaffected by a fire in area C-33. Therefore, operation of either hand switch SBHS0001 or SBHS0042 will cause a reactor trip on redundant Train A reactor trip switchgear SB102A.

References: XX-E-013, E-15000, E-13SB12A, E-1F9101

5.2.39 RCS Hot and Cold Leg Temperature Indication

PFSSD requires RCS hot and cold leg temperature indication on at least one loop to verify flow through the steam generators. The temperature elements and control room indicators used for this purpose are listed in the following table.

RCS Hot and Cold Leg Temperature Elements/Indicators Used for PFSSD		
ELEMENT	**INDICATOR**	**FUNCTION**
BBTE0413A	BBTI0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	BBTI0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	BBTR0423	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	BBTI0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	BBTR0433	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	BBTR0433	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	BBTR0443	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	BBTR0433	RCS Cold Leg Temperature Element (WR) Loop 4

Cable 16RLY01EA supplies 120 VAC power to control room panel RL021/RL022. At RL021/RL022, the power is split and supplies power to BBTR0433 and BBTR0443, as well as other non-PFSSD components. Damage to this cable could disrupt power to BBTR0433 and BBTR0443. Consequently, loops 3 and 4 RCS temperature indication could be lost. However, RCS temperature indication on loops 1 and 2 remains available. Therefore, the PFSSD function is satisfied.

References: E-15000, XX-E-013, E-13BB15, E-13RL01, E-13RL06, E-1F9201, E-1F9421, M-12BB01

5.2.40 Load Center PG20 Incoming Feeder Breaker PG2001

Load center feeder breaker PG2001 is credited for PFSSD because it supplies power to credited non-safety related loads. Cable 16PGG13DA, associated with PG2001, runs in this area. Damage to this cable will trip the breaker.

Breaker PG2001 supplies power to the following PFSSD components:

- PG20GBR217 – MCB Misc. Power Circuits RL023
- PG20GER5 – Instr. Bus Transformer Alt. Feed XPN08D

PFSSD components powered from PG20GBR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG20GER5 is credited as one source of power to PN08. The redundant source of power from NG02BBF1 could also be affected by a fire in this area as discussed in Section 5.2.33. Redundant components powered from inverter PN07 are unaffected by a fire in this area.

Based on the above discussion, loss of breaker PG2001 will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-11PK02, E-13PG10, E-13PG11, E-13PG13, E-13RL07, E-1F9421, E-1F9422C, E-1F9424E, KD-7496

5.2.41 120 VAC Distribution Panel PN410

120 VAC distribution panel PN410 supplies power to NSSS control panels RP043 and RP047.

Inverter PN04 supplies power to 120 VAC distribution panel PN410 (via cables 16PNY02AA and 16PNY02AB), which in turn supplies redundant 120 VAC power to NSSS control cabinets RP043 and RP047. For PFSSD, cabinet RP043 houses relays BGLCV0459X and BGLCV0460X, which are associated with letdown isolation valves BGLCV0459 and BGLCV0460, respectively. Cabinet RP047 includes controls for pressurizer PORVs and pressurizer spray.

Damage to cables 16PNY02AA and/or 16PNY02AB will disrupt power to panel PN410. Redundant power to RP043 and RP047 is available from 120 VAC distribution panel PN310. Therefore, loss of power to PN410 will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-1F9421, DCP 13324

5.2.42 Normal Pressurizer Spray

The normal pressurizer spray valves are included in the PFSSD design because spurious operation of pressurizer sprays can cause a decrease in pressure which can lead to boiling in the core. The pressurizer spray valves are part of the pressurizer pressure control system.

The pressurizer normal spray valves (BBPCV0455B and BBPCV0455C) operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

An instrument cable (14BBI16NB) associated with pressurizer pressure transmitter BBPT0458 is run in fire area C-33. Damage to this cable could send a spurious high-pressure signal to the pressure control system. However, as discussed in Calculation XX-E-013, Appendix 1, damage to a single pressure channel will not cause the spurious operation of the pressurizer spray valves due to the Ovation 4-channel validation logic, which uses the 2nd highest signal as the validated signal and has built-in logic to detect and ignore a failed input.

Based on the above discussion, the pressurizer spray valves will not spuriously open if a fire occurs in this area.

References: E-15000, XX-E-013, E-13BB19, M-744-00028, DCP 13324

FIRE AREA C-34

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-34 is located on the 2073 elevation of the Control Building and includes the room listed in Table C-34-1.

Table C-34-1
Rooms Located in Fire Area C-34

ROOM #	DESCRIPTION
C34	South Small Elec Chase 2073 Elevation at CA-C6

Fire area C-34 is protected with an automatic fire suppression and detection system. The area is bounded on all sides by minimum 3-hour fire resistance rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-34-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the potential fire impact on some of the more significant PFSSD equipment, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-34-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-34

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	All PFSSD functions associated with the main steam system are satisfied. Power to ARV ABPV0002 controller ABPIC0002A in the main control room could be lost. The ARV will remain closed or will fail closed. The remaining ARVs are unaffected. Main steam to TDAFP supply valves ABHV0005 and ABHV0006 may be affected. The motor driven auxiliary feedwater pumps are available.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. Pressure transmitter ALPT0038 may be affected. Pressure transmitters ALPT0037 and ALPT0039 are unaffected. TDAFP suction pressure indicator ALPI0026A may be affected. Pressure indication for the MDAFPs remains available. Main steam to TDAFP supply valves ABHV0005 and ABHV0006 may be affected. The motor driven auxiliary feedwater pumps are available.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.

Table C-34-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-34

System	System Name	PFSSD Function*	Comments
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.

Table C-34-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-34

System	System Name	PFSSD Function*	Comments
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
NF	Load Shed and Emergency Load Sequencing	S	All PFSSD functions associated with load shed/emergency load sequencing system are satisfied. Load shed/sequencer channel 2 could be affected. Channels 1, 3 and 4 are unaffected.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.

Table C-34-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-34

System	System Name	PFSSD Function*	Comments
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
RL	Control Room MCB	S	Separation group 2 Class 1E 125 VDC power to RL005/RL006 could be affected. This only affects valves ABHV0005 and ABHV0006. Remaining power supplies to RL005/RL006 are unaffected.
RP	Miscellaneous Control Panels	R, M, H, P, S	Power to panel RP053DA could be affected. Power to remaining RP panels is unaffected.
SA	ESFAS	S	The PFSSD support function associated with the ESFAS system is satisfied. ESFAS channel 2 could be affected. ESFAS channels 1, 3 and 4 are unaffected.
SB	Reactor Protection System	R, S	All PFSSD functions associated with the reactor protection system are satisfied. Reactor protection system channel 2 could be affected but channels 1, 3 and 4 remain available.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-34.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-34. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is unaffected by a fire in fire area C-34.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-34.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-34

There are no PFSSD components located in fire area C-34. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-34-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-34. The applicable evaluation section is also listed in Table C-34-3.

Table C-34-3
PFSSD Cables Located in Fire Area C-34

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12ALI08BA	C34	ALPT0038	I	5.2.1	ESFAS AFW Low Suction Press Transmitter
12NFK01CA	C34	NF039A	C	5.2.2	Load Shed / Sequencer Ch. 1 Logic
12NFK01DA	C34	NF039B	C	5.2.2	Load Shed / Sequencer Ch. 4 Logic
12NFY01CA	C34	NF039A	P	5.2.2	Load Shed / Sequencer Ch. 1 Logic
12NFY01DA	C34	NF039B	P	5.2.2	Load Shed / Sequencer Ch. 4 Logic
12NFY01EA	C34	NF039A	C	5.2.2	Load Shed / Sequencer Ch. 1 Logic
12NFY01FA	C34	NF039B	C	5.2.2	Load Shed / Sequencer Ch. 4 Logic
12RLK01AA	C34	RL005/006	P	5.2.1	125 VDC to Turbine Gen & Fdwtr Ctrl Pnl (RL005/RL006)
12RPY09AA	C34	RP053DA	P	5.2.1	120 VAC to BOP Instrumentation Rack from NN0208
12SAK21CA	C34	SA036C	P	5.2.1	125 VDC to ESFAS Channel 2 Term Cab from NK4205
12SAY21CA	C34	SA036C	P	5.2.1	120 VAC to ESFAS Channel 2 Term Cab from NN0205
12SAZ23AA	C34	ABHV0005	C	5.2.1	Main STM Loop 2 To TDAFW Pump
12SAZ23BA	C34	ABHV0006	C	5.2.1	Main STM Loop 3 To TDAFW Pump
12SBS01BD	C34	SB029A	P	5.2.3	120 VAC to SSPS A Input Panel from NN0210
12SBS02BD	C34	SB032A	P	5.2.3	120 VAC to SSPS B Input Panel from NN0209
12SBY09DA	C34	SB042	P	5.2.3	120 VAC to Process Protection Set 2 Panel from NN0212

5.2.1 Auxiliary Feedwater and Steam Generator ARVs

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire auxiliary feedwater (AFW) demand to achieve cold shutdown.

Cable 12RPY09AA supplies 120 VAC power from NN0208 to BOP instrument rack RP053DA. Damage to this cable will affect the following PFSSD components:

- ALPY0038A - ESFAS LOW SUCTION PRESSURE SIGNAL CONVERTER
- ALPT0038 - ESFAS LOW SUCTION PRESSURE TRANSMITTER
- ABPIC0002A - STM GEN B ATM STEAM DUMP PRESSURE CONTROLLER
- ABHS0002 - ABPV0002 HANDSWITCH
- ALPI0026A - TDAFW PUMP PAL02 SUCTION PRESSURE

Low suction pressure (LSP) on 2 out of 3 AFW pressure transmitters (ALPT0037, ALPT0038 and ALPT0039) coincident with an auxiliary feedwater actuation signal (AFAS) will swap the AFW supply to ESW. Loss of power to ALPT0038 and ALPY0038A will satisfy 1/3 LSP logic, placing the LSP signal logic in a 1 out of 2 configuration. Therefore, low suction pressure or loss of power on another pressure transmitter will provide the permissive to swap if an AFAS is present. In addition, cable 12ALI08BA is an instrument cable associated with AFW suction pressure transmitter ALPT0038. Damage to this cable could cause a false pressure indication on ALPI0038 but will not satisfy the 2 out of 3 LSP logic.

Loss of power to ABPIC0002A and ABHS0002 will prevent control of steam generator B ARV ABPV0002 from the control room. If this occurs, the ARV will remain closed, which is the desired PFSSD position. The remaining three steam generator ARVs remain available.

Loss of power to ALPI0026A will provide false indication of TDAFP suction pressure. Suction pressure indication for the MDAFPs remains available.

Cable 12RLK01AA supplies 125 VDC power from NK4206 to RL005/006, where it's split and supplies control power to TDAFP main steam supply valves ABHV0005 and ABHV0006, as well as other non-PFSSD components. Cables 12SAZ23AA and 12SAZ23BA are control cables associated with TDAFP steam supply valves ABHV0005 and ABHV0006, respectively. Damage to these cables could cause a loss of control of these valves. In the event the valves cannot be opened, the motor driven auxiliary feedwater pumps are available to supply the required AFW demand.

Panel SA036C monitors pressure transmitter signals on ALPT0038 and provides AFAS outputs. Power cables 12SAK21CA and 12SAY21CA associated with SA036C are run in this area. Damage to these cables could result in a loss of power to the panel but will not prevent automatic operation of low suction pressure (LSP) swapover since the remaining 2 channels are available. AFAS is not credited for PFSSD but is analyzed for potential adverse impacts.

Based on the above discussion, auxiliary feedwater is assured if a fire occurs in area C-34 using Train B MDAFP supplying water to steam generators A and D and Train A MDAFP supplying water to steam generators B and C, however steam generator B ARV control could be lost.

References: E-15000, XX-E-013, E-13AB01, E-13AB01A, E-13AL08, E-13NK01, E-13NK02, E-13NN01, E-13RL01, E-13RL03, E-13RP09, E-13SA21, E-13SA23, E-1F9101, E-1F9103, E-1F9201, E-1F9202, E-1F9203, E-1F9204, J-10SA, J-104-00390, J-110-00219, J-110-00588, J-110-00590, J-110-00947, J-122000, M-12AB01, M-12AB02, M-12AL01

5.2.2 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

The outputs from each safeguards bus (NB01 and NB02) are divided into 4 separation groups; 1, 2, 3 and 4 and routed to two control panels, NF039A and NF039B. The input section of each control panel also receives group 1, 2, 3 and 4 instrument power (120VAC). The inputs then pass through isolation devices, at which point all inputs to NF039A become separation group 1 and all inputs to NF039B become separation group 4. Interruption of either the inputs or the instrument power from one separation group would impact the associated input channel, but would not impact the other 3 input channels.

Cables 12NFK01CA and 12NFK01DA are associated with separation group 2 UV relays on buses NB01 and NB02, respectively. Cables 12NFY01EA and 12NFY01FA are associated with separation group 2 degraded voltage PTs on buses NB01 and NB02, respectively. Cables associated with the remaining three UV relays and PTs from separation groups 1, 3 and 4 do not run in fire area C-34.

Separation group 2 120 VAC instrument power supply cables 12NFY01CA and 12NFY01DA for load shedder/sequencer logic and input cabinets NF039A and NF039B, respectively, run in fire area C-34. Damage to these cables could cause a loss of separation group 2 120 VAC instrument power to the group 3 input panels, and therefore loss of input channel 2. Channels 1, 3 and 4 instrument AC power remains available from separation groups 1, 3 and 4 power supplies.

Automatic functioning of the bus NB01 and NB02 emergency load shedder / sequencer is unaffected by a fire in area C-34 because of the presence of circuits for only one of the four load shed/sequencer initiators. Therefore, a spurious start of the Train A and Train B diesel generators due to a false undervoltage condition on two of the four circuits is not credible.

Based on the above discussion, the Train A and Train B load shed/sequencers are available if a fire occurs in this area. Off-site power to both trains is unaffected based on Calculation XX-E-013, Appendix 2.

References: XX-E-013, E-15000, E-11005, E-11NB02, E-13NF01, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B

5.2.3 Reactor Protection System

The Reactor Protection System (RPS) monitors specified input parameters and initiates reactor protection features whenever those parameters are outside specified limits. Field installed transmitters continuously monitor various parameters and report the results to one of four process cabinets, one per channel. Signals are then sent from the process cabinets to both solid state protection cabinets, one on each train. The cabinets and associated channel are listed in the following table.

Process Cabinets	Solid State Protection Cabinets
Cabinet SB038 - Channel 1 Cabinet SB042 - Channel 2 Cabinet SB037 - Channel 3 Cabinet SB041 - Channel 4	Cabinet SB029A - Train A Input Cabinet Cabinet SB029B - Train A Logic Cabinet Cabinet SB029C - Train A Output Cabinet 1 Cabinet SB029D - Train A Output Cabinet 2 Cabinet SB032A - Train B Input Cabinet Cabinet SB032B - Train B Logic Cabinet Cabinet SB032C - Train B Output Cabinet 1 Cabinet SB032D - Train B Output Cabinet 2

The RPS is actuated upon 2/3 or 2/4 coincident logic, depending on the input parameter. This ensures that a loss of a single channel will not prevent the system from performing its function. Loss of power to a single cabinet will render the channel or Train inoperative.

Cables associated with RPS channel 2 run through this area. These cables supply power from separation group 2 power supplies to panels SB029A, SB032A and SB042. Power cables associated with RPS channels 1, 3 and 4 are run in a separate fire area.

Damage to cables associated with the RPS due to a fire in this area could cause a loss of RPS channel 2 but channels 1, 3 and 4 remain available. Damage to these cables will not adversely impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-13NN01, E-13SB01, E-13SB02, E-13SB09, E-1F9421, E-1F9431, E-1F9432, E-1F9433

FIRE AREA C-35

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-35 is located on the 2016 elevation of the Control Building and includes the rooms listed in Table C-35-1.

Table C-35-1
Rooms Located in Fire Area C-35

ROOM #	DESCRIPTION
3401	West Corridor Elevation 2016-0
3406	East Center Corridor Elevation 2016-0
3412	East Corridor Elevation 2016-0

Fire area C-35 has no installed fire suppression or detection. Where redundant circuits are run through area C-35, and diverse means for achieving PFSSD are not available, circuits associated with the protected component are wrapped with a raceway fire barrier material meeting the requirements for a 3-hour fire rating. This fire barrier provides reasonable assurance that PFSSD can be achieved.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-35-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-35-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-35

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.

Table C-35-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-35

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The Train B Class 1E electrical equipment room cooler SGK05B is affected. The Train A Class 1E electrical equipment room cooler SGK05A may shut down due to a spurious fire isolation signal. The fire isolation signal can be bypassed from the main control room using GKHS0101 on panel RP068 and SGK05A can be started.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
KC	Fire Protection	S	Cables associated with Halon protection in class 1E electrical equipment switchboard rooms 3404, 3408, 3410 and 3414 could be damaged by a fire in area C-35, causing Halon release in these rooms and subsequent shutdown of SGK05A and SGK05B. This will not adversely impact PFSSD (See GK discussion).
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.

Table C-35-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-35

System	System Name	PFSSD Function*	Comments
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.

Table C-35-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-35

System	System Name	PFSSD Function*	Comments
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
SA	ESFAS	S	Status panel input for SGK05A and SGK05B could be affected. This will not adversely impact PFSSD.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-35.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-35. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Class 1E Electrical Equipment Room Cooler SGK05A

If a fire occurs in area C-35, SGK05A may not respond to an automatic start signal or may shut down due to a fire isolation signal. If this occurs, start SGK05A by placing GKHS0101 in bypass and start the unit normally. GKHS0101 is located on panel RP068 in the main control room.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post Fire Safe Shutdown is assured if a fire occurs in fire area C-35.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-35.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-35

PFSSD components (S. in E-15000) located in fire area C-35 are shown in Table C-35-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table C-35-3.

Table C-35-3 PFSSD Equipment Located in Fire Area C-35				
Room #	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
3401	KC230	Swbd and Swgr Room Fire Protection Panel	5.1.1	

5.1.1 Class 1E Electrical Equipment Room Coolers

Class 1E electrical equipment room coolers SGK05A and SGK05B are included in the PFSSD design to ensure proper room cooling for the operating train of safety-related electrical equipment.

Fire protection panel KC230 houses auxiliary contacts for automatic shutdown of Class 1E A/C Units SGK05A and SGK05B. In the event of a fire detection signal in any of the Class 1E switchgear rooms, auxiliary contacts in panel KC230 open, dropping power to relays 95XGK07 and 95XGK08 which in turn opens a contact associated with the SGK05A and SGK05B control circuit and stops the unit.

Cables 15GKK31CB and 16GKK31DB, associated with relays 95XGK07 and 95XGK08 are run in area C-35 which, if damaged, could cause a spurious shutdown of both SGK05A and SGK05B.

Cables 16KCQ21FA and 16KCQ21JA run from the main fire alarm panel (KC275A) to Halon releasing panel KC230, located on the 2016 elevation of the control building in fire area C-35. Panel KC275A monitors smoke detectors in Halon protected switchboard rooms that are conditioned by SGK05A. Upon receipt of the proper detection sequence at KC275A, a normally open auxiliary relay contact in KC275 closes and sends an equipment shutdown signal over cables 16KCQ21FA or 16KCQ21JA to KC230. The equipment shutdown signal received at KC230 initiates actuation of Halon in the affected room and shuts down SGK05A. If the cables are damaged in a fire and short circuit, Halon will be released into the Train A Class 1E electrical equipment rooms and class 1E A/C unit SGK05A will shut down.

Cables 16KCQ21EA and 16KCQ21HA run from the main fire alarm panel (KC275A) to Halon releasing panel KC230, located on the 2016 elevation of the control building in fire area C-35. Panel KC275A monitors smoke detectors in Halon protected switchboard rooms that are conditioned by SGK05B. Upon receipt of the proper detection sequence at KC275A, a normally open auxiliary relay contact in KC275 closes and sends an equipment shutdown signal over cables 16KCQ21EA or 16KCQ21HA to KC230. The equipment shutdown signal received at KC230 initiates actuation of Halon in the affected room and shuts down SGK05B. If the cables are damaged in a fire and short circuit, Halon will be released into the Train B Class 1E electrical equipment rooms and class 1E A/C unit SGK05B will shut down.

Power and control cables associated with SGK05A and SGK05B are run in area C-35. Cables associated with SGK05A have been wrapped with a 3-hour fire rated material which provides reasonable assurance that these cables will be unaffected by a fire in this area. However, the fire wrap does not provide protection for cable 15GKK31CB or fire protection panel KC230. Cables associated with SGK05B are not protected with fire wrap. This includes the 3-phase power cable for SGK05B. Therefore, a fire in area C-35 could disable SGK05B and could cause a spurious trip of SGK05A.

If SGK05A shuts down due to a spurious fire isolation signal, the fire isolation signal can be bypassed by placing hand switch GKHS0101, located on panel RP068, in bypass position. Then, the unit can be re-started from the control room using normal procedures.

Cable 11SAZ19KA provides status indication of Train A Class 1E electrical equipment room A/C unit SGK05A at status panel SA066A. Damage to this cable could prevent operation of SGK05A. However, the cable is protected by a 3-hour fire rated barrier within fire area C-35. Therefore, there is reasonable assurance that the cable will not be affected by a fire in area C-35.

Cable 14SAZ20HA provides status indication of Train B Class 1E electrical equipment room A/C unit SGK05B at status panel SA066B. Damage to this cable could prevent operation of SGK05B.

Based on the above discussion, the Train B Class 1E A/C unit SGK05B could be affected by a fire in this area but the Train A Class 1E A/C unit SGK05A is available.

References: E-15000, XX-E-013, E-13GK13, E-13GK13A, E-13GK31, E-13KC21, E-13SA19, E-13SA20, E-1F9444, J-12GK13, M-10GK, M-12GK03, M-655-00009, M-658-00042, M-658-00043, M-658-00044, DCP 12169, M-622.1A-00002

5.2 PFSSD CABLE EVALUATION

Table C-35-4 lists all the PFSSD cables (S. in E-15000) located in fire area C-35. The applicable evaluation section is also listed in Table C-35-4.

Table C-35-4
PFSSD Cables Located in Fire Area C-35

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GKG13AA	3401	SGK05A	P	5.1.1	Train A Class 1E A/C Unit
11GKG13AB	3401	SGK05A	C	5.1.1	Train A Class 1E A/C Unit
11GKG13AH	3401	SGK05A	C	5.1.1	Train A Class 1E A/C Unit
11GKG13AJ	3401	SGK05A	C	5.1.1	Train A Class 1E A/C Unit
11SAZ19KA	3401	SGK05A	C	5.1.1	Train A Class 1E A/C Unit
14GKG13BA	3401	SGK05B	P	5.1.1	Train B Class 1E A/C Unit
14GKG13BH	3401	SGK05B	C	5.1.1	Train B Class 1E A/C Unit
14GKG13BK	3401	SGK05B	C	5.1.1	Train B Class 1E A/C Unit
14GKG13BM	3401	SGK05B	C	5.1.1	Train B Class 1E A/C Unit
14SAZ20HA	3401	SGK05B	C	5.1.1	Train B Class 1E A/C Unit
15GKK31CB	3401	SGK05A	C	5.1.1	Train A Class 1E A/C Unit
16GKK31DB	3401	SGK05B	C	5.1.1	Train B Class 1E A/C Unit
16KCQ21EA	3401	SGK05B	C	5.1.1	Fire Detection Actuation Circuit
16KCQ21FA	3401	SGK05A	C	5.1.1	Fire Detection Actuation Circuit
16KCQ21HA	3401	SGK05B	C	5.1.1	Fire Detection Actuation Circuit
16KCQ21JA	3401	SGK05A	C	5.1.1	Fire Detection Actuation Circuit

FIRE AREA C-36

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area C-36 is located on the 2000 elevation of the Control Building and includes the room listed in Table C-36-1.

Table C-36-1
Rooms Located in Fire Area C-36

ROOM #	DESCRIPTION
C36	South Small Elec Chase at CA-C16, 2000 to 2016 Elevation

Fire area C-36 is protected with an automatic wet pipe sprinkler system but no smoke detection system. The area is bounded on all sides by minimum 3-hour fire resistance rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-36-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the potential fire impact on some of the more significant PFSSD equipment, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-36-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-36

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	Steam generator ARV ABPV0002 may spuriously open. Steam generator ARVs ABPV0001, ABPV0003 and ABPV0004 are unaffected.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
AE	Main Feedwater	H, P	Steam generator B wide range water level transmitter AELT0502 may be affected. Remaining steam generator level transmitters are unaffected.
AL	Aux. Feedwater System	H, P	All PFSSD functions associated with the auxiliary feedwater system are satisfied. The turbine driven auxiliary feedwater pump (TDAFP) may not be available. The motor driven auxiliary feedwater pumps are unaffected.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
BB	Reactor Coolant System	R, M, H, P, S	Pressurizer level transmitter BBLT0460 may be affected. Redundant pressurizer level transmitter BBLT0459 is unaffected. RCS Temperature elements BBTE0423B and BBTE0443A, as well as associated temperature indicators, could be affected by a fire in this area. The remaining temperature elements/indicators are unaffected.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.

Table C-36-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-36

System	System Name	PFSSD Function*	Comments
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
FC	Auxiliary Turbines	R, H, P	The TDAFP speed control valve FCFV0313 could be affected. The motor driven auxiliary feedwater pumps are available.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.

Table C-36-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-36

System	System Name	PFSSD Function*	Comments
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
NF	Load Shed and Emergency Load Sequencing	S	All PFSSD functions associated with load shed/emergency load sequencing system are satisfied. Load shed/sequencer channel 2 could be affected. Channels 1, 3 and 4 are unaffected.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
NN	120VAC	S	One of two sources of 125 VDC power to swing inverter NN16 could be affected. The remaining source is unaffected. Swing inverter NN16 may not be able to supply power to bus NN02. Inverter NN12 is unaffected and can supply 120 VAC power to NN02.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.

Table C-36-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-36

System	System Name	PFSSD Function*	Comments
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
RP	Miscellaneous Control Panels	R, M, H, P, S	120 VAC power to panel RP147A could be affected, preventing operation of ABPV0002 and FCFV0313. This will not adversely impact PFSSD as discussed in AB and FC summaries above.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
SB	Reactor Protection System	R, S	120 VAC power to panel SB148A could be affected, preventing operation of BBLI0460B, BBTI0423X, AELI0502A and BBTI0443X at the auxiliary shutdown panel. Indication of these parameters in the main control room is unaffected.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-36.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-36. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Steam Generator ARVs

If damage occurs to cables associated with ABPV0002, local control station ABFHC0002, located in fire area A-23, can be used to close ARV ABPV0002.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is unaffected by a fire in fire area C-36.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-36.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-36

There are no PFSSD components located in fire area C-36. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-36-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-36. The applicable evaluation section is also listed in Table C-36-3.

Table C-36-3
PFSSD Cables Located in Fire Area C-36

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12ABI20FE	C36	ABPV0002	I	5.2.1	Steam Generator B Atmospheric Relief Valve
12ABI20FG	C36	ABPV0002	I	5.2.1	Steam Generator B Atmospheric Relief Valve
12ABI20FH	C36	ABPV0002	I	5.2.1	Steam Generator B Atmospheric Relief Valve
12ABI20FJ	C36	ABPV0002	I	5.2.1	Steam Generator B Atmospheric Relief Valve
12ABI20FK	C36	ABPV0002	I	5.2.1	Steam Generator B Atmospheric Relief Valve
12ABI20FL	C36	ABPV0002	I	5.2.1	Steam Generator B Atmospheric Relief Valve
12ABI20FM	C36	ABPV0002	I	5.2.1	Steam Generator B Atmospheric Relief Valve
12ABI20FN	C36	ABPV0002	I	5.2.1	Steam Generator B Atmospheric Relief Valve
12AEI08GB	C36	AELT0502	I	5.2.4	Steam Generator B Wide Range Water Level
12ALI07KD	C36	ALPT0026	I	5.2.2	TDAFP Suction Pressure
12ALI07KE	C36	ALPT0026	I	5.2.2	TDAFP Suction Pressure
12ALI07KF	C36	ALPT0026	I	5.2.2	TDAFP Suction Pressure
12BBI15HB	C36	BBTE0423B	I	5.2.4	RCS Loop 2 Cold Leg Temperature
12BBI15JB	C36	BBTE0443A	I	5.2.4	RCS Loop 4 Hot Leg Temperature
12BBI16QB	C36	BBLT0460	I	5.2.4	Pressurizer Narrow Range Level Transmitter
12FCK24AK	C36	FCFV0313	I	5.2.2	TDAFP Speed Control and Monitoring
12FCK24AL	C36	FCFV0313	I	5.2.2	TDAFP Speed Control and Monitoring
12FCK24AM	C36	FCFV0313	I	5.2.2	TDAFP Speed Control and Monitoring
12FCK24AN	C36	FCFV0313	I	5.2.2	TDAFP Speed Control and Monitoring
12FCK24AP	C36	FCFV0313	I	5.2.2	TDAFP Speed Control and Monitoring
12FCK24AQ	C36	FCFV0313	I	5.2.2	TDAFP Speed Control and Monitoring
12NFK01CA	C36	NF039A	C	5.2.3	Load Shedder / Emergency Load Sequencer
12NFK01DA	C36	NF039B	C	5.2.3	Load Shedder / Emergency Load Sequencer

Table C-36-3
PFSSD Cables Located in Fire Area C-36

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12NFY01EA	C36	NF039A	C	5.2.3	Load Shedder / Emergency Load Sequencer
12NFY01FA	C36	NF039B	C	5.2.3	Load Shedder / Emergency Load Sequencer
12NNK01LA	C36	NN16	P	5.2.5	125 VDC Power to Swing Inverter NN16
12NNK01LB	C36	NN16	P	5.2.5	125 VDC Power to Swing Inverter NN16
12NNY01GA	C36	NN12	P	5.2.5	120 VAC Pwr to NN12 from Swing Inv NN16
12NNY01GB	C36	NN12	P	5.2.5	120 VAC Pwr to NN12 from Swing Inv NN16
12RPY09BA	C36	RP147A	P	5.2.2	120 VAC to RP147A from NN0203
12SBS16AA	C36	AELI0502A	I	5.2.4	Steam Generator B Wide Range Water Level
12SBS16BA	C36	BBTI0423X	I	5.2.4	RCS Cold Leg Loop 2 Temperature
12SBS16GA	C36	BBLI0460B	I	5.2.4	Pressurizer Level Narrow Range
12SBS16HA	C36	BBTI0443A	I	5.2.4	RCS Hot Leg Loop 4 Temperature
12SBY09GA	C36	SB148A	P	5.2.4	120 VAC to Control Room Isolation Cabinet from NN0217

5.2.1 Steam Generator Atmospheric Relief Valves

PFSSD requires at least two steam generator atmospheric relief valves (ARV) be controlled and the other two closed. The ARVs are pneumatically operated using air from the compressed air system (KA) or nitrogen from the nitrogen accumulators. The valves open by pneumatic pressure and close by spring action. A pressure transmitter installed on the outlet side of the steam generator sends a signal to a controller and automatically controls the associated ARV position. Alternatively, each ARV can be controlled manually from the control room or the auxiliary shutdown panel by placing the pressure indicating controller (PIC) in manual.

Cables associated with steam generator atmospheric relief valve ABPV0002 are run in area C-36. Cables associated with the remaining three steam generator atmospheric relief valves are unaffected by a fire in area C-36. If damage occurs to cables associated with ABPV0002 such that the ARV spuriously opens, local controller ABFHC0002, located in fire area A-23, can be used to close ARV ABPV0002.

Based on the above discussion, the spurious opening of ARV ABPV0002 will not adversely impact PFSSD and can be mitigated by a manual action if desired.

Up to three ARVs can fail closed or open without impacting ability to achieve and maintain hot standby according to thermal hydraulic analysis WCNOC-CP-002. With at least one ARV unaffected, no E-1F9900 OMA is required to address ARV closure or control. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 23.

References: E-15000, XX-E-013, E-13AB20B, E-1F9101, M-12AB01, E-13AB06B

5.2.2 Auxiliary Feedwater

The PFSSD design requires the use of one auxiliary feedwater pump (AFP) supplying water to at least two steam generators. The Train A motor driven auxiliary feedwater pump (MDAFP) is aligned to supply steam generators B and C. The Train B MDAFP is aligned to supply steam generators A and D. The turbine driven auxiliary feedwater pump (TDAFP) is normally aligned to supply all four steam generators.

The normal source of water to the AFPs is the condensate storage tank (CST). The emergency supply is from the essential service water (ESW) system. For commercial concerns, the CST is the preferred source and contains sufficient volume to supply the entire auxiliary feedwater (AFW) demand to achieve cold shutdown.

Cable 12RPY09BA supplies 120 VAC power to RP147A. The only PFSSD component controlled by RP147A is ABPV0002. Therefore, loss of power to RP147A could prevent operation of ABPV0002.

Cables associated with TDAFP speed governing valve FCFV0313 are run through fire area C-36. Damage to these cables could prevent operation of the TDAFP. Main steam flow to the TDAFP can be isolated using FCHV0312. Loss of the TDAFP is acceptable since the Motor Driven Auxiliary Feedwater Pumps (MDAFP) are available. Therefore, the auxiliary feedwater requirement for decay heat removal is satisfied if a fire occurs in area C-36.

Cables associated with ALPT0026, TDAFW pump suction pressure transmitter, are run through area C-36. Loss of ALPT0026 is acceptable since either MDAFP is used for PFSSD if a fire occurs in area C-36.

Based on the above discussion, the TDAFP may not be available if a fire occurs in this area. This is acceptable since both MDAFPs are unaffected by a fire in this area.

References: E-15000, XX-E-013, E-11NK02, E-13AL07B, E-13FC24, E-13RP09, E-1F9101, E-1F9202, M-12AB02, M-12AL01, M-12FC02

5.2.3 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

The outputs from each safeguards bus (NB01 and NB02) are divided into 4 separation groups; 1, 2, 3 and 4 and routed to two control panels, NF039A and NF039B. The input section of each control panel also receives group 1, 2, 3 and 4 instrument power (120VAC). The inputs then pass through isolation devices, at which point all inputs to NF039A become separation group 1 and all inputs to NF039B become separation group 4. Interruption of either the inputs or the instrument power from one separation group would impact the associated input channel, but would not impact the other 3 input channels.

Cables 12NFK01CA and 12NFK01DA are associated with separation group 2 UV relays on buses NB01 and NB02, respectively. Cables 12NFY01EA and 12NFY01FA are associated with separation group 3 degraded voltage PTs on buses NB01 and NB02, respectively. Cables associated with the remaining three UV relays and PTs from separation groups 1, 3 and 4 do not run in fire area C-36.

Automatic functioning of the bus NB01 and NB02 emergency load shedder / sequencer is unaffected by a fire in area C-36 because of the presence of circuits for only one of the four load shed/sequencer initiators. Therefore, a spurious start of the Train A and Train B diesel generators due to a false undervoltage condition on two of the four circuits is not credible.

Based on the above discussion, the Train A and Train B load shed/sequencers are available if a fire occurs in this area. Off-site power to both trains is unaffected based on Calculation XX-E-013, Appendix 2.

References: XX-E-013, E-15000, E-11005, E-13NF01, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, J-104-00347

5.2.4 Process Monitoring

Process monitoring is required to achieve and maintain safe shutdown. Some of the process instruments credited for safe shutdown could be affected by a fire in area C-36. These instruments, as well as the available redundant capability, are described in the following paragraphs.

Steam generator level indication is required to support the decay heat removal function. At least one level transmitter is required on each steam generator being used for heat removal. Cables 12AEI08GB, associated with steam generator B wide range level transmitter AELT0502, and 12SBS16AA, associated with steam generator B wide range level indicator AELI0502A, are run in fire area C-36. Narrow range level indication on steam generator B

remains available. Cables for the remaining level transmitters are not run in fire area C-36. Therefore, level indication on all four steam generators is available.

RCS hot and cold leg temperature indication is required on at least one loop to verify flow through the steam generators. The following table lists the RCS temperature elements credited for PFSSD.

RCS Hot and Cold Leg Temperature Elements Used for PFSSD	
COMPONENT	**FUNCTION**
BBTE0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	RCS Cold Leg Temperature Element (WR) Loop 4

Temperature elements BBTE0423B and BBTE0443A, as well as associated temperature indicators, could be affected by a fire in this area. The remaining temperature elements/indicators are unaffected. Therefore, RCS hot and cold leg temperature indication remains available on loops 1 and 3.

Pressurizer level indication is required to be available to ensure pressurizer level does not go off-scale. Pressurizer level indication is provided by level transmitters BBLT0459 and BBLT0460. Circuits for BBLT0460 are run in area C-36, so BBLT0460 may not be available. Circuits for BBLT0459/BBLI0459A do not run through fire area C-36 and are unaffected by a fire. Therefore, pressurizer level indication is available for a fire in area C-36 using BBLT0459/BBLI0459A.

Cable 12SBY09GA supplies 120 VAC power from NN0217 to SB148A. Panel SB148A receives signals from certain field transmitters (BBLT0460, BBTE0423, AELT0502 and BBTE0443) and sends the signals to the control room and the auxiliary shutdown panel (ASP). This ensures reliable diagnostic instrumentation is available at the ASP if a fire occurs in the control room. Loss of 120 VAC power to SB148A will prevent signals from these transmitters from reaching the control room and the ASP. However, redundant diagnostic instrumentation remains available in the control room. Therefore, loss of AC power will not impact PFSSD.

Based on the above discussion, process monitoring is available if a fire occurs in fire area C-36.

References: E-15000, XX-E-013, E-13AE08, E-13BB15, E-13BB16, E-13NN01, E-13SB09, E-13SB16, E-1F9201, E-1F9203, E-1F9301, M-12AE02, M-12BB01, M-12BB02

5.2.5 Class 1E 120 VAC Electrical Distribution System

The Class 1E 120 VAC electrical distribution system provides power to vital instrumentation and control loads for shutdown and normal operation. Under normal conditions, the system is supplied by inverters connected to the 125 VDC NK battery system. Swing inverters allow the primary inverters to be taken out of service for maintainance or repair without disrupting power to the associated vital AC bus. In the event of a loss of power to the inverters, a backup source of power is automatically lined up. The backup power source originates from the 480 VAC electrical distribution system (NG).

Cables 12NNK01LA and 12NNK01LB supply 125 VDC power from NK0203 to manual transfer switch NK80. Damage to these cables will disrupt the 125 VDC power supply from NK0203 to swing inverter NN16. 125 VDC power from NK0403 to swing inverter NN16 is unaffected.

Cables 12NNY01GA and 12NNY01GB supply 120 VAC power from swing inverter NN16 to bus NN02 through a manual transfer switch in inverter NN12. Damage to these cables will disrupt the 120 VAC power supply from swing inverter NN16 to NN02.

Inverters NN12 and NN14 and 120 VAC vital distribution buses NN02 and NN04 are located in a separate fire area and are unaffected by a fire in area C-20. The 125 VDC and 480 VAC power supply to inverters NN12 and NN14 are unaffected by a fire in area C-20.

Based on the above discussion, the Train A and Train B vital 120 VAC electrical distribution system is unaffected by a fire in this area.

References: XX-E-013, E-15000, E-13NN01

FIRE AREA C-37

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1.0 GENERAL AREA DESCRIPTION

Fire area C-37 is located on the 2000 elevation of the Control Building and includes the room listed in Table C-37-1.

Table C-37-1
Rooms Located in Fire Area C-37

ROOM #	DESCRIPTION
C37	North Small Elec Chase 2000 Elevation

Fire area C-37 is protected with an automatic fire suppression and detection system. The area is bounded on all sides by minimum 3-hour fire resistance rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table C-37-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the potential fire impact on some of the more significant PFSSD equipment, see Section 8.0 of the Fire Area Analysis Narrative section.

Table C-37-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-37

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.

Table C-37-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-37

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.

Table C-37-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-37

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
NF	Load Shed and Emergency Load Sequencing	S	All PFSSD functions associated with load shed/emergency load sequencing system are satisfied. Load shed/sequencer channel 3 could be affected. Channels 1, 2 and 4 are unaffected.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
NN	120VAC	S	One of two sources of 125 VDC power to swing inverter NN15 could be affected. The remaining source is unaffected. Swing inverter NN15 may not be able to supply power to bus NN03. Inverter NN13 is unaffected and can supply 120 VAC power to NN03.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.

Table C-37-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area C-37

System	System Name	PFSSD Function*	Comments
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area C-37.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area C-37. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is unaffected by a fire in area C-37.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area C-37.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA C-37

There are no PFSSD components located in fire area C-37. This fire area only contains cables associated with PFSSD equipment located in other areas.

5.2 PFSSD CABLE EVALUATION

Table C-37-3 lists all the PFSSD cables (S. in E-15000) located in fire area C-37. The applicable evaluation section is also listed in Table C-37-3.

Table C-37-3
PFSSD Cables Located in Fire Area C-37

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
13NFK01CA	C37	127-3/DG	C	5.2.1	NB01 Undervoltage Relay
13NFK01DA	C37	127-3/DG	C	5.2.1	NB02 Undervoltage Relay
13NFY01GA	C37	PTNB117/B	C	5.2.1	NB01 Degraded Voltage Potential Transformer
13NFY01HA	C37	PTNB217/B	C	5.2.1	NB02 Degraded Voltage Potential Transformer
13NNK01KA	C37	NN15	P	5.2.2	125 VDC Power to Swing Inverter NN15
13NNK01KB	C37	NN15	P	5.2.2	125 VDC Power to Swing Inverter NN15
13NNY01FA	C37	NN13	P	5.2.2	120 VAC Power from NN15 to NN13
13NNY01FB	C37	NN13	P	5.2.2	120 VAC Power from NN15 to NN13

5.2.1 Load Shedder / Emergency Load Sequencer

The load shedder and emergency load sequencers are included in the PFSSD design to evaluate the impact of spurious operation or mal-operation. The load shedder/emergency load sequencer operates upon presence of the following conditions:

1. An undervoltage (UV) on a safeguards bus,
2. A safety injection signal (SIS) or a containment spray actuation signal (CSAS), or
3. An undervoltage on a safeguards bus with a SIS or CSAS.

Eight inputs (four undervoltage (UV) inputs and four degraded voltage inputs) on each safeguards bus (NB01 and NB02) monitor voltage conditions on that bus. An undervoltage condition on two of four UV relays on each bus will actuate the load shedder/sequencer and send a signal to start the associated diesel generator. In addition, degraded voltage sensed by two of four degraded voltage potential transformers (PTs) will, after a time delay, provide a signal to open the offsite feeder breakers on the associated bus.

Cables 13NFK01CA and 13NFK01DA are associated with one of the four UV relays on buses NB01 and NB02, respectively. Cables 13NFY01GA and 13NFY01HA are associated with one of the four degraded voltage PTs on buses NB01 and NB02, respectively. Cables associated with the remaining three UV relays and PTs do not run in fire area C-37.

Based on the above discussion, the Train A and Train B load shed/sequencers are available if a fire occurs in this area. Off-site power to both trains is unaffected based on Calculation XX-E-013, Appendix 2.

References: XX-E-013, E-15000, E-11005, E-11NB02, E-13NF01, E-10NF, E-1F9411A, E-1F9411B, E-1F9412A, E-1F9412B, J-104-00347

5.2.2 Class 1E 120 VAC Electrical Distribution System

The Class 1E 120 VAC electrical distribution system provides power to vital instrumentation and control loads for shutdown and normal operation. Under normal conditions, the system is supplied by inverters connected to the 125 VDC NK battery system. Swing inverters allow the primary inverters to be taken out of service for maintainance or repair without disrupting power to the associated vital AC bus. In the event of a loss of power to the inverters, a backup source of power is automatically lined up. The backup power source originates from the 480 VAC electrical distribution system (NG).

Cables 13NNK01KA and 13NNK01KB supply 125 VDC power from NK0303 to manual transfer switch NK79. Damage to these cables will disrupt the 125 VDC power supply from NK0303 to swing inverter NN15. 125 VDC power from NK0103 to swing inverter NN15 is unaffected.

Cables 13NNY01FA and 13NNY01FB supply 120 VAC power from swing inverter NN15 to bus NN03 through a manual transfer switch in inverter NN13. Damage to these cables will disrupt the 120 VAC power supply from swing inverter NN15 to NN03.

Inverters NN11 and NN13 and 120 VAC vital distribution buses NN01 and NN03 are located in a separate fire area and are unaffected by a fire in area C-19. The 125 VDC and 480 VAC power supply to inverters NN11 and NN13 are unaffected by a fire in area C-37.

Based on the above discussion, the Train A and Train B vital 120 VAC electrical distribution system is unaffected by a fire in this area.

References: XX-E-013, E-15000, E-13NN01

FIRE AREA CST

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1.0 GENERAL AREA DESCRIPTION

Fire area CST includes the area around and including the Condensate Storage Tank (CST). The CST is located outside on the northeast side of Containment.

Table CST-1
Rooms Located in Fire Area CST

ROOM #	DESCRIPTION
9101	Condensate Storage Tank Valve House
CST	Condensate Storage Tank

There is no automatic fire detection or suppression in the CST valve house. Manual fire suppression capabilities are present in the yard area adjacent to the CST. Based on the Fire Hazards Analysis (E-1F9905), the combustible loading around the CST is low.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table CST-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table CST-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area CST

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
AP	Condensate Storage System	H	In the unlikely event the CST is unavailable, the ESW system is available to provide a suction source to the auxiliary feedwater system.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.

Table CST-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area CST			
System	**System Name**	**PFSSD Function***	**Comments**
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.

Table CST-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area CST			
System	**System Name**	**PFSSD Function***	**Comments**
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.

Table CST-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area CST			
System	**System Name**	**PFSSD Function***	**Comments**
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area CST.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area CST. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in fire area CST.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area CST.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA CST

PFSSD components (S. in E-15000) located in fire area CST are shown in Table CST-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table CST-3.

Table CST-3 PFSSD Equipment Located in Fire Area CST				
Room #	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
CST	TAP01	Condensate Storage Tank	5.1.1	

5.1.1 Condensate Storage Tank

The Condensate Storage Tank (CST) is the primary source of water to the auxiliary feedwater (AFW) system. If the CST is unavailable, AFW pump suction can be taken from the essential service water (ESW) system. The ESW system is the safety-related suction source for AFW and is credited as a redundant source for PFSSD.

Catastrophic failure of the CST due to an exposure fire is not considered credible. Administrative controls limit the quantity of combustibles stored in the vicinity of the CST and normal in-situ combustible loading is low, per E-1F9905. The tank is made Stainless Steel and is insulated to protect against freezing. The administrative controls, low combustible loading, steel tank construction together with the large heat sink provided by the water in the tank provides reasonable assurance that the CST will remain available in the event of a fire.

In the unlikely event the CST is unavailable, the ESW system remains available to provide the required suction source for AFW. Therefore, a severe fire in the vicinity of the CST will not impact the ability to achieve and maintain safe shutdown.

References: E-15000, XX-E-013, E-1F9202, E-1F9204, M-12AP01

5.2 PFSSD CABLE EVALUATION

There are no PFSSD cables located in this fire area.

FIRE AREA D-1

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area D-1 is located on the 2000'-0" elevation of the Diesel Generator Building and includes the rooms listed in Table D-1-1.

Table D-1-1
Rooms Located in Fire Area D-1

ROOM #	DESCRIPTION
5203	Train A Diesel Generator Room
5203A	Train A Diesel Engine Underground Fuel Tank Area

Except for the underground fuel tank area, fire area D-1 is protected with an automatic pre-action fire suppression system. In addition, automatic fire detection is installed throughout room 5203.

Fire Area D-1 contains cables and equipment for Train A safety-related and non-safety related components. Redundant Train B cables and components are located in a separate fire area divided by 3-hour fire rated construction. The 3-hour fire rated barrier provides reasonable assurance that a fire in area D-1 will not affect Train B components and therefore the ability to achieve and maintain safe shutdown in the event of a fire in area D-1 is assured.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table D-1-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table D-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area D-1

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.

Table D-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area D-1

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
GM	Emergency Diesel Generator Room HVAC	S	The Train A diesel generator room exhaust damper could be affected. The Train B diesel generator room exhaust damper is unaffected.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
KJ	Standby Diesel Engine	S	The Train A emergency diesel engine could be affected. The Train B emergency diesel engine is available.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.

Table D-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area D-1

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	Off-site power to NB01 could be affected due to a secondary fire from an open circuit in the diesel generator output current transformer. Off-site power to NB02 is unaffected. See the current transformer assessment in CR 46637 for additional information.
NE	Standby Diesel Generator	S	The Train A diesel generator may be affected. The Train B diesel generator is available.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
NG	480V Load Centers and MCCs	S	Train A 480 V MCC NG03D may be affected. Train B 480 V load centers and MCCs are available.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.

Table D-1-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area D-1			
System	**System Name**	**PFSSD Function***	**Comments**
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-1.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area D-1. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in area D-1.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area D-1.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA D-1

PFSSD components (S. in E-15000) located in fire area D-1 are shown in Table D-1-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table D-1-3.

Table D-1-3 PFSSD Equipment Located in Fire Area D-1				
Room #	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
5203	EKJ03A	Train A Diesel Engine Intercooler Heat Exchanger	5.1.1	
5203	EKJ04A	Train A Diesel Engine Lube Oil Cooler	5.1.1	
5203	EKJ06A	Train A Diesel Engine Jacket Water Heat Exchanger	5.1.1	
5203	DCGM01A	Train A Diesel Generator Room Supply Fan	5.1.1	
5203	GMHY0009	Train A Diesel Generator Room Exhaust Damper Actuator	5.1.1	
5203	GMHZ0009	Train A Diesel Generator Room Exhaust Damper	5.1.1	
5203	GMTE0001	Train A Diesel Generator Room Temperature Element	5.1.1	
5203	GMTZ0001A	Train A Diesel Generator Room Inlet Damper Actuator	5.1.1	
5203	GMTZ0001B	Train A Diesel Generator Room Recirc Damper Actuator	5.1.1	
5203	JEHS0001B	Train A Emergency Fuel Oil Xfer Pump Hand Switch	5.1.1	
5203	JELG0009	Train A Emergency Fuel Oil Day Tank Level Gauge	5.1.1	
5203	JELT0001	Train A Emergency Fuel Oil Day Tank Level Xmtr	5.1.1	
5203	KJ121	Train A Diesel Generator Gauge and Control Panel	5.1.1	
5203	KJHS0001C	Train A Diesel Generator Start Hand Switch	5.1.1	
5203	KJHS0001D	Train A Diesel Generator Emerg Start Hand Switch	5.1.1	
5203	KJHS0007B	Train A Diesel Generator Gov. Speed Control Switch	5.1.1	
5203	KJHS0008B	Train A Diesel Generator Stop Hand Switch	5.1.1	
5203	KJHS0009	Train A Diesel Generator Master Transfer Switch	5.1.1	
5203	KJLG0070	Train A Diesel Gen Jacket Wtr Expansion Tank Level	5.1.1	
5203	KJPV0001A	Train A Diesel Generator Starting Air Inlet Isolation Valve	5.1.1	
5203	KJPV0001B	Train A Diesel Generator Starting Air Inlet Isolation Valve	5.1.1	
5203	KJPV0008	Train A Diesel Generator Shutdown Solenoid Valve	5.1.1	

Table D-1-3
PFSSD Equipment Located in Fire Area D-1

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
5203	KKJ01A	Train A Emergency Diesel Engine	5.1.1	
5203	NE01	Train A Emergency Diesel Generator	5.1.1	
5203	NE03	NE001 Neutral Grounding Resistor	5.1.1	
5203	NE107	Train A Diesel Generator Control and Relay Panel	5.1.1	
5203	NEHS0011B	Train A Diesel Generator Voltage Regulator Selector Switch	5.1.1	
5203	NEHS0015B	Train A Diesel Generator Manual Voltage Regulator Switch	5.1.1	
5203	NEHS0021	Train A Diesel Generator Exciter Shutdown Hand Switch	5.1.1	
5203	NEHS0023	Train A Diesel Generator Exciter Reset Hand Switch	5.1.1	
5203	NG03D	480VAC Class 1E Diesel Generator Room MCC	5.1.1	
5203	NG03DAF1	Incoming Line from Load Center NG03	5.1.1	
5203	NG03DBF6	Train A Diesel Generator Room Ventilation Supply Fan	5.1.1	
5203	NG03DEF1	Distribution Panel	5.1.1	
5203	NG03DEF4	Train A Emergency Fuel Oil Xfer Pump Motor (DPJE01A)	5.1.1	
5203	TJE02A	Train A Emergency Fuel Oil Day Tank	5.1.1	
5203	TKJ01A	Train A Diesel Generator Jacket Wtr Expansion Tank	5.1.1	
5203	TKJ02A	Train A Diesel Generator Starting Air Tank	5.1.1	
5203	TKJ02B	Train A Diesel Generator Starting Air Tank	5.1.1	
5203	TVKJ01	Terminal Box	5.1.1	
5203	TVNE01	Terminal Box	5.1.1	
5203	TVNE03	Terminal Box	5.1.1	
5203	TVNE05	Terminal Box	5.1.1	
5203A	DPJE01A	Train A Emerg Fuel Oil Xfer Pump Motor	5.1.1	

Table D-1-3
PFSSD Equipment Located in Fire Area D-1

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
5203A	TJE01A	Train A Emerg Fuel Oil Storage Tank	5.1.1	
5203A	TB02110	Train A Emerg Fuel Oil Xfer Pump Terminal Box	5.1.1	

5.1.1 Standby Diesel Generators

The standby diesel generators are credited for PFSSD in the event a fire causes a loss of off-site power to the safety related electrical buses.

The Train A emergency diesel generator, as well as a number of associated components and cables, are located in fire area D-1. Consequently, a fire in this area could prevent operation of the Train A emergency diesel generator. The Train B emergency diesel generator as well as associated cables and components are unaffected by a fire in area D-1.

Based on the above discussion, a fire in area D-1 which affects the Train A emergency diesel generator will not adversely impact the ability to energize either safety related bus.

References: E-15000, XX-E-013, E-13GM01, E-13GM04, E-13JE01, E13JE04, E-13KJ01A, E-13KJ06, E-13NB01, E-13NE01, E-13NE10, E-13NE12, E-1F9411A, E-1F9412A, CR 46637

5.2 PFSSD CABLE EVALUATION

Table D-1-4 lists all the PFSSD cables (S. in E-15000) located in fire area D-1. The applicable evaluation section is also listed in Table D-1-4.

Table D-1-4
PFSSD Cables Located in Fire Area D-1

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11GMG01AA	5203	DCGM01A	P	5.1.1	Train A Diesel Generator Room Supply Fan
11GMG01AB	5203	DCGM01A	C	5.1.1	Train A Diesel Generator Room Supply Fan
11GMG01AD	5203	DCGM01A	C	5.1.1	Train A Diesel Generator Room Supply Fan
11GMG01AH	5203	DCGM01A	P	5.1.1	Train A Diesel Generator Room Supply Fan
11GMI02AA	5203	GMTE0001	I	5.1.1	Train A ESW Pump Room Temperature Element
11GMI02AB	5203	GMTZ0001A	I	5.1.1	Train A ESW Pump Room Inlet Damper
11GMI02AC	5203	GMTZ0001B	I	5.1.1	Train A ESW Pump Room Recirc Damper
11GMK04AA	5203	GMHZ0009	C	5.1.1	Train A EDG Room Exhaust Damper Actuator
11GMK04AB	5203	GMHZ0009	C	5.1.1	Train A EDG Room Exhaust Damper Actuator
11GMY02AA	5203	GMTZ0001A	P	5.1.1	Train A ESW Pump Room Inlet Damper
11GMY02BA	5203	GMTZ0001B	P	5.1.1	Train A ESW Pump Room Inlet Damper
11JEG01AA	5203, 5203A	DPJE01A	P	5.1.1	Train A EDG Fuel Oil Transfer Pump
11JEG01AB	5203	DPJE01A	C	5.1.1	Train A EDG Fuel Oil Transfer Pump
11JEG01AC	5203	DPJE01A	C	5.1.1	Train A EDG Fuel Oil Transfer Pump
11JEG01AD	5203	DPJE01A	C	5.1.1	Train A EDG Fuel Oil Transfer Pump
11JEG01AE	5203	DPJE01A	C	5.1.1	Train A EDG Fuel Oil Transfer Pump
11JEG01AG	5203A	DPJE01A	P	5.1.1	Train A EDG Fuel Oil Transfer Pump
11JEG01AH	5203A	DPJE01A	P	5.1.1	Train A EDG Fuel Oil Transfer Pump
11JEG01AJ	5203A	DPJE01A	P	5.1.1	Train A EDG Fuel Oil Transfer Pump
11JEI04AA	5203	JELT0001	I	5.1.1	Train A EDG Fuel Oil Day Tank Level Xmtr
11KAK02AA	5203	KAFV0029	C	5.2.1	Containment Instrument Air Supply Valve

Table D-1-4
PFSSD Cables Located in Fire Area D-1

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11KJK01AA	5203	KJ121	P	5.1.1	Train A Diesel Generator Control Panel
11KJK01AC	5203	KJ121	C	5.1.1	Train A Diesel Generator Control Panel
11KJK01AD	5203	KJ121	C	5.1.1	Train A Diesel Generator Control Panel
11KJK01AE	5203	KJ121	C	5.1.1	Train A Diesel Generator Control Panel
11KJK01AF	5203	KJ121	C	5.1.1	Train A Diesel Generator Control Panel
11KJK01AH	5203	KJ121	C	5.1.1	Train A Diesel Generator Control Panel
11KJK01AK	5203	KJ121	C	5.1.1	Train A Diesel Generator Control Panel
11KJK01AM	5203	KJ121	I	5.1.1	Train A Diesel Generator Control Panel
11KJK06AC	5203	KKJ01A	I	5.1.1	Train A Diesel Generator Governor Control
11KJK06AD	5203	KKJ01A	C	5.1.1	Train A Diesel Generator Governor Control
11KJK06AE	5203	KKJ01A	I	5.1.1	Train A Diesel Generator Governor Control
11KJK06AF	5203	KKJ01A	I	5.1.1	Train A Diesel Generator Governor Control
11NBB01AF	5203	NE107	C	5.1.1	Train A EDG Control and Relay Panel
11NEB01AA	5203	NE001	P	5.1.1	Train A Diesel Generator
11NEB01AB	5203	NE001	P	5.1.1	Train A Diesel Generator
11NEB01AC	5203	NE001	P	5.1.1	Train A Diesel Generator
11NEB01AD	5203	NE001	P	5.1.1	Train A Diesel Generator
11NEB01AE	5203	NE001	P	5.1.1	Train A Diesel Generator
11NEB01AF	5203	NE001	P	5.1.1	Train A Diesel Generator
11NEB01AG	5203	NE001	C	5.1.1	Train A Diesel Generator
11NEB01AH	5203	NE003	P	5.1.1	NE001 Neutral Grounding Resistor
11NEB01AJ	5203	NE001	P	5.1.1	Train A Diesel Generator

Table D-1-4
PFSSD Cables Located in Fire Area D-1

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11NEB01AK	5203	NE001	C	5.1.1	Train A Diesel Generator
11NEB01AL	5203	NE001	P	5.1.1	Train A Diesel Generator
11NEB01AP	5203	NE001	P	5.1.1	Train A Diesel Generator
11NEB01AQ	5203	NE001	P	5.1.1	Train A Diesel Generator
11NEB01AR	5203	NE001	P	5.1.1	Train A Diesel Generator
11NEB01AS	5203	NE001	P	5.1.1	Train A Diesel Generator
11NEB01AT	5203	NE001	P	5.1.1	Train A Diesel Generator
11NEB01AU	5203	NE001	P	5.1.1	Train A Diesel Generator
11NEB01AV	5203	NE001	P	5.1.1	Train A Diesel Generator
11NEB10AB	5203	NB0111	C	5.1.1	Train A D/G Feeder Breaker NB0111 Control
11NEB10AC	5203	NB0111	C	5.1.1	Train A D/G Feeder Breaker NB0111 Control
11NEB10AF	5203	NB0111	C	5.1.1	Train A D/G Feeder Breaker NB0111 Control
11NEB10AG	5203	NB0111	C	5.1.1	Train A D/G Feeder Breaker NB0111 Control
11NEB10AJ	5203	NB0111	C	5.1.1	Train A D/G Feeder Breaker NB0111 Control
11NEK12AA	5203	NE0107	P	5.1.1	Train A D/G Exciter Control Power
11NEK12AD	5203	NE0107	C	5.1.1	Train A D/G Relay / Control Panel
11NEK12AE	5203	NE0107	C	5.1.1	Train A D/G Relay / Control Panel
11NEK12AF	5203	NE0107	I	5.1.1	Train A D/G Relay / Control Panel
11NEK12AH	5203	NE0107	C	5.1.1	Train A D/G Relay / Control Panel
11NEK12AJ	5203	NE0107	I	5.1.1	Train A D/G Relay / Control Panel
11NGG01BD	5203	NG03D	P	5.1.1	Train A Class 1E Diesel Generator Room MCC
11NGG01BE	5203	NG03D	P	5.1.1	Train A Class 1E Diesel Generator Room MCC

5.2.1 Containment Air Supply

Valve KAFV0029 is an isolation valve on the containment compressed air supply line. This valve is credited for PFSSD in the event of a fire in certain areas to isolate air to letdown isolation valves BGLCV0459 and BGLCV0460 and pressurizer spray valves BBPCV0455B and BBPCV0455C to fail the valves closed. Valve KAFV0029 is a diverse means of closing these valves if the fire prevents closing the valves using their respective control room hand switches.

Cable 11KAK02AA is a control cable associated with valve KAFV0029. Damage to this cable could prevent closure of the valve from the control room or could cause the valve to spuriously close. If the valve spuriously closes, PFSSD will not be affected as documented in WIP-E-1F9900-004-A-1.

A fire in area D-1 does not require closure of the air supply to containment to achieve PFSSD. Letdown isolation valves BGLCV0459 and BGLCV0460 are unaffected by a fire in this area and can be closed from the control room to isolate letdown. In addition, pressurizer spray valves BBPCV0455B and BBPCV0455C are unaffected by a fire in this area. Therefore, valve KAFV0029 is not credited for a fire in this area.

Based on the above discussion, damage to cable 11KAK02AA will have no adverse impact on the ability to achieve and maintain safe shutdown following a fire in this area.

References: E-15000, XX-E-013, E-13KA02, WIP-E-1F9900-004-A-1

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1.0 GENERAL AREA DESCRIPTION

Fire area D-2 is located on the 2000'-0" elevation of the Diesel Generator Building and includes the rooms listed in Table D-2-1.

Table D-2-1
Rooms Located in Fire Area D-2

ROOM #	DESCRIPTION
5201	Train B Diesel Generator Room
5201A	Train B Diesel Engine Underground Fuel Tank Area

Except for the underground fuel tank area, fire area D-2 is protected with an automatic pre-action fire suppression system. In addition, automatic fire detection is installed throughout room 5201.

Fire Area D-2 contains cables and equipment for Train B safety-related and non-safety related components. Redundant Train A cables and components are located in a separate fire area divided by 3-hour fire rated construction. The 3-hour fire rated barrier provides reasonable assurance that a fire in area D-2 will not affect Train A components and therefore the ability to achieve and maintain safe shutdown in the event of a fire in area D-2 is assured.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table D-2-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table D-2-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area D-2

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.

Table D-2-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area D-2

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
GM	Emergency Diesel Generator Room HVAC	S	Train B EDG room ventilation could be affected. Train A EDG room ventilation is unaffected.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
KJ	Standby Diesel Engine	S	The Train B emergency diesel engine could be affected. The Train A emergency diesel engine is available.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.

Table D-2-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area D-2

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	Off-site power to NB02 could be affected due to a secondary fire from an open circuit in the diesel generator output current transformer. Off-site power to NB01 is unaffected. See the current transformer assessment in CR 46637 for additional information.
NE	Standby Diesel Generator	S	The Train B diesel generator may be affected. The Train A diesel generator is available.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
NG	480V Load Centers and MCCs	S	Train B 480 V MCC NG04D may be affected. Train A 480 V load centers and MCCs are available.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.

Table D-2-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area D-2			
System	**System Name**	**PFSSD Function***	**Comments**
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area D-2.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area D-2. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in area D-2.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area D-2.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA D-2

PFSSD components (S. in E-15000) located in fire area D-2 are shown in Table D-2-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table D-2-3.

Table D-2-3
PFSSD Equipment Located in Fire Area D-2

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
5201	EKJ03B	Train B Diesel Engine Intercooler Heat Exchanger	5.1.1	
5201	EKJ04B	Train B Diesel Engine Lube Oil Cooler	5.1.1	
5201	EKJ06B	Train B Diesel Engine Jacket Water Heat Exchanger	5.1.1	
5201	DCGM01B	Train B Diesel Generator Room Supply Fan	5.1.1	
5201	GMHS0011B	Train B Diesel Generator Room Supply Fan HS	5.1.1	
5201	GMHY0019	Train B Diesel Generator Room Exhaust Damper Actuator	5.1.1	
5201	GMHZ0019	Train B Diesel Generator Room Exhaust Damper	5.1.1	
5201	GMTE0011	Train B Diesel Generator Room Temperature Element	5.1.1	
5201	GMTZ0011A	Train B Diesel Generator Room Inlet Damper Actuator	5.1.1	
5201	GMTZ0011B	Train B Diesel Generator Room Recirc Damper Actuator	5.1.1	
5201	JEHS0021B	Train B Emergency Fuel Oil Xfer Pump Hand Switch	5.1.1	
5201	JEHS0021C	Isolation Handswitch For DPJE01B	5.1.1	
5201	JELG0029	Train B Emergency Fuel Oil Day Tank Level Gauge	5.1.1	
5201	JELT0021	Train B Emergency Fuel Oil Day Tank Level Xmtr	5.1.1	
5201	KJ122	Train B Diesel Generator Gauge and Control Panel	5.1.1	
5201	KJHS0101C	Train B Diesel Generator Start Hand Switch	5.1.1	
5201	KJHS0101D	Train B Diesel Generator Emerg Start Hand Switch	5.1.1	
5201	KJHS0107B	Train B Diesel Generator Gov. Speed Control Switch	5.1.1	
5201	KJHS0108B	Train B Diesel Generator Stop Hand Switch	5.1.1	
5201	KJHS0109	Train B Diesel Generator Master Transfer Switch	5.1.1	
5201	KJHS0110	Train B EDG Field Flash Isolation Switch	5.1.1	
5201	KJLG0170	Train B Diesel Gen Jacket Wtr Expansion Tank Level	5.1.1	
5201	KJPV0101A	Train B Diesel Generator Starting Air Inlet Isolation Valve	5.1.1	
5201	KJPV0101B	Train B Diesel Generator Starting Air Inlet Isolation Valve	5.1.1	

Table D-2-3
PFSSD Equipment Located in Fire Area D-2

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
5201	KJPV0108	Train B Diesel Generator Shutdown Solenoid Valve	5.1.1	
5201	KKJ01B	Train B Emergency Diesel Engine	5.1.1	
5201	NE02	Train B Emergency Diesel Generator	5.1.1	
5201	NE04	NE002 Neutral Grounding Resistor	5.1.1	
5201	NE106	Train B Diesel Generator Control and Relay Panel	5.1.1	
5201	NEHS0012B	Train B Diesel Generator Voltage Regulator Selector Switch	5.1.1	
5201	NEHS0013B	Train B Diesel Generator Manual Voltage Regulator Switch	5.1.1	
5201	NEHS0014B	Train B Diesel Generator Auto Voltage Regulator Switch	5.1.1	
5201	NEHS0016B	Train B Diesel Generator Manual Voltage Regulator Sw	5.1.1	
5201	NEHS0022	Train B Diesel Generator Exciter Shutdown Hand Switch	5.1.1	
5201	NEHS0024	Train B Diesel Generator Exciter Reset Hand Switch	5.1.1	
5201	NG04D	480VAC Class 1E Diesel Generator Room MCC	5.1.1	
5201	NG04DAF1	Incoming Line from Load Center NG03	5.1.1	
5201	NG04DBF6	Train B Diesel Generator Room Ventilation Supply Fan	5.1.1	
5201	NG04DDF3	Train B Emergency Fuel Oil Xfer Pump Motor (DPJE01B)	5.1.1	
5201	NG04DEF1	Distribution Panel	5.1.1	
5201	TJE02B	Train B Emergency Fuel Oil Day Tank	5.1.1	
5201	TKJ01B	Train B Diesel Generator Jacket Wtr Expansion Tank	5.1.1	
5201	TKJ02C	Train B Diesel Generator Starting Air Tank	5.1.1	
5201	TKJ02D	Train B Diesel Generator Starting Air Tank	5.1.1	
5201	TVKJ02	Terminal Box	5.1.1	
5201	TVNE02	Terminal Box	5.1.1	
5201	TVNE04	Terminal Box	5.1.1	
5201	TVNE06	Terminal Box	5.1.1	

Table D-2-3
PFSSD Equipment Located in Fire Area D-2

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
5201A	DPJE01B	Train B Emerg Fuel Oil Xfer Pump Motor	5.1.1	
5201A	TJE01B	Train B Emerg Fuel Oil Storage Tank	5.1.1	
5201A	TB02111	Train B Emerg Fuel Oil Xfer Pump Terminal Box	5.1.1	

5.1.1 Standby Diesel Generators

The standby diesel generators are credited for PFSSD in the event a fire causes a loss of off-site power to the safety related electrical buses.

The Train B emergency diesel generator, as well as a number of associated components and cables, are located in fire area D-2. Consequently, a fire in this area could prevent operation of the Train B emergency diesel generator. The Train A emergency diesel generator as well as associated cables and components are unaffected by a fire in area D-2.

Based on the above discussion, a fire in area D-2 which affects the Train B emergency diesel generator will not adversely impact the ability to energize either safety related bus.

References: E-15000, XX-E-013, E-13GM01A, E-13GM04A, E-13JE01A, E13JE04, E-13KJ03A, E-13KJ07, E-13NB04, E-13NE02, E-13NE11, E-13NE13, E-1F9411B, E-1F9412B, CR 46637

5.2 PFSSD CABLE EVALUATION

Table D-2-4 lists all the PFSSD cables (S. in E-15000) located in fire area D-2. The applicable evaluation section is also listed in Table D-2-4.

All PFSSD cables that run in Fire Area D-2 terminate at their associated PFSSD equipment within Fire Area D-2. Therefore, all cable evaluations are included with the equipment evaluations in Section 5.1. Any possible combination of hot shorts, open circuits or shorts to ground could prevent operation or cause mal-operation of the associated Train B equipment. Cables associated with redundant Train A equipment are unaffected and therefore PFSSD can be achieved.

Table D-2-4
PFSSD Cables Located in Fire Area D-2

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14GMG01BA	5201	DCGM01B	P	5.1.1	Train B Diesel Generator Room Supply Fan
14GMG01BF	5201	DCGM01B	C	5.1.1	Train B Diesel Generator Room Supply Fan
14GMG01BH	5201	DCGM01B	C	5.1.1	Train B Diesel Generator Room Supply Fan
14GMG01BJ	5201	DCGM01B	C	5.1.1	Train B Diesel Generator Room Supply Fan
14GMG01BK	5201	DCGM01B	C	5.1.1	Train B Diesel Generator Room Supply Fan
14GMG01BL	5201	DCGM01B	P	5.1.1	Train B Diesel Generator Room Supply Fan
14GMI02CA	5201	GMTE0011	I	5.1.1	Train B ESW Pump Room Temperature Element
14GMI02CB	5201	GMTZ0011A	I	5.1.1	Train B ESW Pump Room Inlet Damper
14GMI02CC	5201	GMTZ0011B	I	5.1.1	Train B ESW Pump Room Recirc Damper
14GMK04BA	5201	GMHZ0019	C	5.1.1	Train B EDG Room Exhaust Damper Actuator
14GMK04BB	5201	GMHZ0019	C	5.1.1	Train B EDG Room Exhaust Damper Actuator
14GMK04BE	5201	GMHZ0019	C	5.1.1	Train B EDG Room Exhaust Damper Actuator
14GMK04BF	5201	GMHZ0019	C	5.1.1	Train B EDG Room Exhaust Damper Actuator
14GMY02CA	5201	GMTZ0011A	P	5.1.1	Train B ESW Pump Room Inlet Damper
14GMY02DA	5201	GMTZ0011B	P	5.1.1	Train B ESW Pump Room Recirc Damper
14JEG01BA	5201, 5201A	DPJE01B	P	5.1.1	Train B EDG Fuel Oil Transfer Pump
14JEG01BB	5201	DPJE01B	C	5.1.1	Train B EDG Fuel Oil Transfer Pump
14JEG01BC	5201	DPJE01B	C	5.1.1	Train B EDG Fuel Oil Transfer Pump
14JEG01BD	5201	DPJE01B	C	5.1.1	Train B EDG Fuel Oil Transfer Pump
14JEG01BE	5201	DPJE01B	C	5.1.1	Train B EDG Fuel Oil Transfer Pump
14JEG01BG	5201A	DPJE01B	P	5.1.1	Train B EDG Fuel Oil Transfer Pump

Table D-2-4
PFSSD Cables Located in Fire Area D-2

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14JEG01BH	5201A	DPJE01B	P	5.1.1	Train B EDG Fuel Oil Transfer Pump
14JEG01BJ	5201A	DPJE01B	P	5.1.1	Train B EDG Fuel Oil Transfer Pump
14JEI04BA	5201	JELT0021	I	5.1.1	Train B EDG Fuel Oil Day Tank Level Xmtr
14KJK03AA	5201	KJ122	P	5.1.1	Train B Diesel Generator Control Panel
14KJK03AC	5201	KJ122	C	5.1.1	Train B Diesel Generator Control Panel
14KJK03AD	5201	KJ122	C	5.1.1	Train B Diesel Generator Control Panel
14KJK03AE	5201	KJ122	C	5.1.1	Train B Diesel Generator Control Panel
14KJK03AF	5201	KJ122	C	5.1.1	Train B Diesel Generator Control Panel
14KJK03AH	5201	KJ122	C	5.1.1	Train B Diesel Generator Control Panel
14KJK03AK	5201	KJ122	C	5.1.1	Train B Diesel Generator Control Panel
14KJK03AM	5201	KJ122	I	5.1.1	Train B Diesel Generator Control Panel
14KJK07AC	5201	KKJ01B	I	5.1.1	Train B Diesel Generator Governor Control
14KJK07AD	5201	KKJ01B	C	5.1.1	Train B Diesel Generator Governor Control
14KJK07AE	5201	KKJ01B	I	5.1.1	Train B Diesel Generator Governor Control
14KJK07AF	5201	KKJ01B	I	5.1.1	Train B Diesel Generator Governor Control
14KJK07AG	5201	KKJ01B	C	5.1.1	Train B Diesel Generator Governor Control
14KJK07AH	5201	KKJ01B	C	5.1.1	Train B Diesel Generator Governor Control
14NBB04AF	5201	NE106	C	5.1.1	Train B EDG Control and Relay Panel
14NEB02AA	5201	NE002	P	5.1.1	Train B Diesel Generator
14NEB02AB	5201	NE002	P	5.1.1	Train B Diesel Generator
14NEB02AC	5201	NE002	P	5.1.1	Train B Diesel Generator
14NEB02AD	5201	NE002	P	5.1.1	Train B Diesel Generator

Table D-2-4
PFSSD Cables Located in Fire Area D-2

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NEB02AE	5201	NE002	P	5.1.1	Train B Diesel Generator
14NEB02AF	5201	NE002	P	5.1.1	Train B Diesel Generator
14NEB02AG	5201	NE002	P	5.1.1	Train B Diesel Generator
14NEB02AH	5201	NE002	P	5.1.1	Train B Diesel Generator
14NEB02AJ	5201	NE002	P	5.1.1	Train B Diesel Generator
14NEB02AL	5201	NE002	C	5.1.1	Train B Diesel Generator
14NEB02AM	5201	NE002	C	5.1.1	Train B Diesel Generator
14NEB02AN	5201	NE002	P	5.1.1	Train B Diesel Generator
14NEB02AP	5201	NE002	P	5.1.1	Train B Diesel Generator
14NEB02AQ	5201	NE002	P	5.1.1	Train B Diesel Generator
14NEB02AR	5201	NE002	P	5.1.1	Train B Diesel Generator
14NEB02AS	5201	NE002	P	5.1.1	Train B Diesel Generator
14NEB02AU	5201	NE002	P	5.1.1	Train B Diesel Generator
14NEB02AV	5201	NE002	P	5.1.1	Train B Diesel Generator
14NEB11AB	5201	NB0211	C	5.1.1	Train B D/G Feeder Breaker NB0211 Control
14NEB11AC	5201	NB0211	C	5.1.1	Train B D/G Feeder Breaker NB0211 Control
14NEB11AF	5201	NB0211	C	5.1.1	Train B D/G Feeder Breaker NB0211 Control
14NEB11AG	5201	NB0211	C	5.1.1	Train B D/G Feeder Breaker NB0211 Control
14NEB11AJ	5201	NB0211	C	5.1.1	Train B D/G Feeder Breaker NB0211 Control
14NEK13AA	5201	NE0106	P	5.1.1	Train B D/G Exciter Control Power
14NEK13AD	5201	NE0106	C	5.1.1	Train B D/G Relay / Control Panel
14NEK13AE	5201	NE0106	C	5.1.1	Train B D/G Relay / Control Panel

Table D-2-4
PFSSD Cables Located in Fire Area D-2

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NEK13AH	5201	NE0106	C	5.1.1	Train B D/G Relay / Control Panel
14NEK13AJ	5201	NE0106	I	5.1.1	Train B D/G Relay / Control Panel
14NGG01BD	5201	NG04D	P	5.1.1	Train B Class 1E Diesel Generator Room MCC
14NGG01BE	5201	NG04D	P	5.1.1	Train B Class 1E Diesel Generator Room MCC

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1.0 GENERAL AREA DESCRIPTION

Fire area ESWA includes the rooms listed in Table ESWA-1.

Table ESWA-1 Rooms Located in Fire Area ESWA	
ROOM #	**DESCRIPTION**
K105	Train A Essential Service Water (ESW) Pump Room
K105A	Train A ESW Duct Bank and Vaults

Fire Area ESWA contains cables and equipment for Train A ESW pump. Redundant Train B cables and components are located in a separate fire area divided by 3-hour fire rated construction. The 3-hour fire rated barrier provides reasonable assurance that a fire in area ESWA will not affect Train B ESW components and therefore the ability to achieve and maintain safe shutdown in the event of a fire in area ESWA is assured.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table ESWA-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table ESWA-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area ESWA

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
AL	Aux. Feedwater System	H, P	Due to the potential loss of the Train A ESW system, the Train A MDAFP may not be available. The Train B ESW system remains available to ensure operability of the Train B MDAFP.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
BG	Chemical and Volume Control System	R, M, S	Due to the potential loss of the Train A ESW system, the Train A CCP may not be available. The Train B ESW system remains available to ensure operability of the Train B CCP.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
EF	Essential Service Water System	H, S	The Train A ESW system is affected. The Train B ESW system is unaffected.
EG	Component Cooling Water System	S	Due to the potential loss of the Train A ESW system, the Train A CCW system may not be available. The Train B ESW system remains available to ensure operability of the Train B CCW system.
EJ	Residual Heat Removal System	M, H, P	Due to the potential loss of the Train A ESW system, the Train A RHR pump may not be available. The Train B ESW system remains available to ensure operability of the Train B RHR pump.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.

Table ESWA-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area ESWA

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
GD	ESW Pump House HVAC	S	The Train A ESW pump room ventilation may be affected. The Train B ESW pump room ventilation is unaffected.
GF	AFW Pump Room Coolers	S	Due to the potential loss of the Train A ESW system, the Train A MDAFP room cooler may not be available. The Train B ESW system remains available to ensure operability of the Train B MDAFP room cooler.
GK	Control Room and Class 1E Switchgear Room Coolers	S	Due to the potential loss of the Train A ESW system, the Train A Class 1E electrical equipment room cooler may not be available. The Train B ESW system remains available to ensure operability of the Train B Class 1E electrical equipment room cooler.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
GN	Containment Coolers	S	Due to the potential loss of the Train A ESW system, the Train A containment coolers may not be available. The Train B ESW system remains available to ensure operability of the Train B containment coolers.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
KJ	Standby Diesel Engine	S	The Train A diesel engine may be affected due to loss of Train A ESW. The Train B diesel generator is available.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.

Table ESWA-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area ESWA

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The Train A NB system is not directly affected by a fire in this area since off-site power remains available. However, due to the potential loss of the Train A Class 1E Electrical Equipment Room Cooler (due to the potential loss of Train A ESW), the NB01 switchgear room temperature could increase beyond that allowed for the equipment to remain functional. Therefore, it is assumed that NB01 is unavailable. If operators require NB01, then they can enter SYS GK-200 to provide cooling to the Train A electrical equipment rooms from Train B Class 1E A/C Unit SGK05B.
NE	Standby Diesel Generator	S	The Train A diesel generator may be affected due to loss of Train A ESW. The Train B diesel generator is available.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
NG	480V Load Centers and MCCs	S	Train A ESW pump room MCC NG05E may be affected. Train B ESW pump room MCC NG06E is unaffected. Train A 480 VAC Load Centers and MCCs could be affected due to loss of NB01 (See NB System Comments). Train B 480 VAC Load Centers and MCCs are unaffected.
NK	125VDC	S	Train A Class 1E 125 VDC distribution switchboards could be affected due to the potential loss of Train A Class 1E Electrical Equipment A/C unit SGK05A. Operators can enter SYS GK-200 to provide cooling to the Train A electrical equipment rooms from Train B Class 1E A/C Unit SGK05B.
NN	120VAC	S	Train A Class 1E 120 VAC distribution switchboards could be affected due to the potential loss of Train A Class 1E Electrical Equipment A/C unit SGK05A. Operators can enter SYS GK-200 to provide cooling to the Train A electrical equipment rooms from Train B Class 1E A/C Unit SGK05B.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.

Table ESWA-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area ESWA

System	System Name	PFSSD Function*	Comments
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWA.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area ESWA. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Component Cooling Water

If Train A component cooling water (CCW) is operating at the time of the fire, it may be necessary to swap to Train B CCW due to the potential loss of Train A ESW.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in area ESWA.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area ESWA.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA ESWA

PFSSD components (S. in E-15000) located in fire area ESWA are shown in Table ESWA-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table ESWA-3.

Table ESWA-3
PFSSD Equipment Located in Fire Area ESWA

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
K105	DCGD01A	Train A ESW Pump Room Supply Fan Motor	5.1.1	
K105	DFEF01A	Train A ESW Traveling Water Screen Motor	5.1.1	
K105	DFEF02A	Train A ESW Self Cleaning Strainer	5.1.1	
K105	DPEF01A	Train A ESW Pump Motor	5.1.1	
K105	EF155	Train A ESW Control Panel	5.1.1	
K105	EFHIS0019	Train A ESW Self Cleaning Strainer HIS	5.1.1	
K105	EFHIS0003	Train A ESW Traveling Water Screen HIS	5.1.1	
K105	EFHIS0055B	Train A ESW Pump HIS	5.1.1	
K105	EFHIS0097	Train A ESW Pump A Air Release Valve HIS	5.1.1	
K105	EFHS0003	Train A ESW Traveling Water Screen Speed Selector Sw	5.1.1	
K105	EFHS0091	Train A ESW Traveling Water Screen Wash Valve Sw	5.1.1	
K105	EFHV0091	Train A ESW Screen Wash Water Valve	5.1.1	
K105	EFHV0097	Train A ESW Pump A Air Release Valve	5.1.1	
K105	EFPDS0019A	Train A ESW Self Cleaning Strainer dP Switch	5.1.1	
K105	EFPDV0019	Train A ESW Self Cleaning Strainer Trash Valve	5.1.1	
K105	EFPT0001	Train A ESW Pump Discharge Pressure	5.1.1	
K105	GDHIS0001B	Train A ESW Pump Room Supply Fan HIS	5.1.1	
K105	GDTE0001	Train A ESW Pump Room Supply Damper Temp Element	5.1.1	
K105	GDTZ0001A	Train A ESW Pump Room Supply Damper Actuator	5.1.1	
K105	GDTZ0001B	Train A ESW Pump Room Recirc Damper Actuator	5.1.1	
K105	GDTZ0001C	Train A ESW Pump Room Exhaust Damper Actuator	5.1.1	
K105	NG05E	Train A ESW Pump Room MCC	5.1.1	
K105	NG05EAF1	NG05E Incoming Line from NB01	5.1.1	
K105	NG05EBF2	Distribution Panel	5.1.1	

Table ESWA-3
PFSSD Equipment Located in Fire Area ESWA

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
K105	NG05ECF1	Relay Panel	5.1.1	
K105	NG05EDF2	Train A ESW Screen Wash Water Valve	5.1.1	
K105	NG05EDF3	Train A ESW Pump A Air Release Valve	5.1.1	
K105	NG05EDF4	Train A ESW Traveling Water Screen Motor	5.1.1	
K105	NG05EEF3	Train A ESW Self Cleaning Strainer Trash Valve	5.1.1	
K105	NG05EEF4	Train A ESW Pump Room Supply Fan Motor	5.1.1	
K105	NG05EFF3	Train A ESW Self Cleaning Strainer	5.1.1	
K105	TBK0201	Terminal Box	5.1.1	
K105	XNG05	Train A ESW Pump Room MCC Transformer	5.1.1	

5.1.1 Train A Essential Service Water (ESW)

This fire area contains equipment and cables associated with the Train A ESW system. Consequently, a fire in this area could result in a loss of Train A ESW, as well as all supported equipment. PFSSD equipment (excluding supported equipment) that requires Train A ESW is as follows:

- Train A containment air coolers
- Train A electrical penetration room cooler
- Train A component cooling water (CCW) pump room cooler
- Train A residual heat removal pump room cooler
- Train A centrifugal charging pump room cooler
- Train A class 1E electrical equipment A/C unit
- Train A control room A/C unit
- Train A motor driven auxiliary feedwater pump room cooler
- Train A auxiliary feedwater pump alternate supply (Note: condensate storage tank (CST) remains available)
- Turbine driven auxiliary feedwater pump alternate supply (Note: CST and Train B ESW remain available)
- Train A CCW heat exchanger
- Train A emergency diesel engine coolers

Loss of Train A ESW causes a loss of a number of Train A components. Therefore, Train A is not available in the event of a fire in the Train A ESW pump room. Train B ESW is unaffected and remains available to supply redundant Train B PFSSD equipment.

Based on the above discussion, a fire in area ESWA which affects the Train A ESW pump will not adversely impact the ability to safely shut down.

References: E-15000, XX-E-013, E-K3EF01, E-K3EF02, E-K3EF03, E-K3EF04, E-K3EF05, E-K3EF06, E-K3EF08, E-K3EF11, E-K3GD01, E-K3GD03, E-K3GD04, E-K3NG01, E-K3NG10, M-12AL01, M-12EF01, M-12EF02, MK2EF01, M-12EG02, M-12GF01, M-12GK01, M-12GK03, M-12GL01, M-12GN01, M-12KJ01, M-K2GD01

5.2 PFSSD CABLE EVALUATION

Table ESWA-4 lists all the PFSSD cables (S. in E-15000) located in fire area ESWA. The applicable evaluation section is also listed in Table ESWA-4.

All PFSSD cables that run in Fire Area ESWA terminate at their associated PFSSD equipment within Fire Area ESWA. Therefore, all cable evaluations are included with the equipment evaluations in Section 5.1. Any possible combination of hot shorts, open circuits or shorts to ground could prevent operation or cause mal-operation of the associated Train A equipment. Cables associated with redundant Train B equipment are unaffected and therefore PFSSD can be achieved.

Table ESWA-4
PFSSD Cables Located in Fire Area ESWA

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EFB01SB	K105	DPEF01A	P	5.1.1	ESW Pump A Motor
11EFB01SE	K105	DPEF01A	P	5.1.1	ESW Pump A Motor
11EFB01SF	K105	DPEF01A	P	5.1.1	ESW Pump A Motor
11EFG02SA	K105	DFEF01A	P	5.1.1	Train A ESW Traveling Water Screen Motor
11EFG02SB	K105	DFEF01A	P	5.1.1	Train A ESW Traveling Water Screen Motor
11EFG02SC	K105	DFEF01A	C	5.1.1	Train A ESW Traveling Water Screen Motor
11EFG02SD	K105	DFEF01A	C	5.1.1	Train A ESW Traveling Water Screen Motor
11EFG02SE	K105	DFEF01A	C	5.1.1	Train A ESW Traveling Water Screen Motor
11EFG02SF	K105	DFEF01A	C	5.1.1	Train A ESW Traveling Water Screen Motor
11EFG03SA	K105	EFHV0091	P	5.1.1	Train A ESW Screen Wash Water Valve
11EFG03SB	K105	EFHV0091	C	5.1.1	Train A ESW Screen Wash Water Valve
11EFG03SC	K105	EFHV0091	C	5.1.1	Train A ESW Screen Wash Water Valve
11EFG03SD	K105	EFHV0091	C	5.1.1	Train A ESW Screen Wash Water Valve
11EFG04SA	K105	DFEF02A	P	5.1.1	Train A ESW Self Cleaning Strainer
11EFG04SB	K105	DFEF02A	C	5.1.1	Train A ESW Self Cleaning Strainer
11EFG04SD	K105	DFEF02A	C	5.1.1	Train A ESW Self Cleaning Strainer
11EFG04SF	K105	DFEF02A	C	5.1.1	Train A ESW Self Cleaning Strainer
11EFG05SA	K105	EFPDV0019	P	5.1.1	Train A ESW Self Cleaniing Strainer Trash Valve
11EFG05SB	K105	EFPDV0019	C	5.1.1	Train A ESW Self Cleaniing Strainer Trash Valve
11EFG06SA	K105	EFHV0097	P	5.1.1	Train A ESW Pump Air Release Valve
11EFG06SB	K105	EFHV0097	C	5.1.1	Train A ESW Pump Air Release Valve

Table ESWA-4
PFSSD Cables Located in Fire Area ESWA

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EFG06SC	K105	EFHV0097	C	5.1.1	Train A ESW Pump Air Release Valve
11EFG06SD	K105	EFHV0097	C	5.1.1	Train A ESW Pump Air Release Valve
11EFG11SA	K105	DPEF01A	C	5.1.1	Train A ESW Pump Control HIS and Interposing Relays
11EFG11TA	K105	DPEF01A	C	5.1.1	Train A ESW Pump Control HIS and Interposing Relays
11EFI08RB	K105	EFPT0001	I	5.1.1	Train A ESW Pump Discharge Pressure
11EFK01SA	K105	DPEF01A	C	5.1.1	Train A ESW Pump Control HIS and Interposing Relays
11GDG01AA	K105	DCGD01A	P	5.1.1	Train A ESW Pump Room Supply Fan
11GDG01AB	K105	DCGD01A	C	5.1.1	Train A ESW Pump Room Supply Fan
11GDG01AD	K105	DCGD01A	C	5.1.1	Train A ESW Pump Room Supply Fan
11GDI04AA	K105	GDTE0001	I	5.1.1	Train A ESW Pump Room Temperature
11GDI04AB	K105	GDTZ0001A	I	5.1.1	Train A ESW Pump Room Inlet Damper
11GDI04AC	K105	GDTZ0001B	I	5.1.1	Train A ESW Pump Room Recirc Damper
11GDY01AD	K105	DCGD01A	C	5.1.1	Train A ESW Pump Room Supply Fan HIS and Interposing Relays
11GDY03AA	K105	GDTZ0001C	P	5.1.1	Train A ESW Pump Room Exhaust Damper Actuator
11GDY04AA	K105	GDTZ0001A	P	5.1.1	Train A ESW Pump Room Supply Damper Actuator
11GDY04BA	K105	GDTZ0001B	P	5.1.1	Train A ESW Pump Room Recirc. Damper Actuator
11NGB10SB	K105	NB0116	P	5.1.1	NB0116 Overcurrent Protection
11NGG01SA	K105	NG05E	P	5.1.1	4.16 kV Power from NB0116 to XNG05

Table ESWA-4 PFSSD Cables Located in Fire Area ESWA					
Cable #	**Location**	**Primary PFSSD Equipment**	**Cable Function** (P) Power (C) Control (I) Instrumentation	**Evaluation Section**	**Comments**
11NGG01SB	K105	NG05E	P	5.1.1	480 V Power from XNG05 to NG05E
11NGG01SD	K105	NG05E	P	5.1.1	XNG05 Time Overcurrent Relay

FIRE AREA ESWB

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area ESWB includes the rooms listed in Table ESWB-1.

Table ESWB-1 Rooms Located in Fire Area ESWB	
ROOM #	**DESCRIPTION**
K104	Train B Essential Service Water (ESW) Pump Room
K104A	Train B ESW Duct Bank and Vaults

Fire Area ESWB contains cables and equipment for Train B ESW pump. Redundant Train A cables and components are located in a separate fire area divided by 3-hour fire rated construction. The 3-hour fire rated barrier provides reasonable assurance that a fire in area ESWB will not affect Train A ESW components and therefore the ability to achieve and maintain safe shutdown in the event of a fire in area ESWB is assured.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table ESWB-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table ESWB-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area ESWB

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
AL	Aux. Feedwater System	H, P	Due to the potential loss of the Train B ESW system, the Train B MDAFP may not be available. The Train A ESW system remains available to ensure operability of the Train A MDAFP.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
BG	Chemical and Volume Control System	R, M, S	Due to the potential loss of the Train B ESW system, the Train B CCP may not be available. The Train A ESW system remains available to ensure operability of the Train A CCP.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
EF	Essential Service Water System	H, S	The Train B ESW system is affected. The Train A ESW system is unaffected.
EG	Component Cooling Water System	S	Due to the potential loss of the Train B ESW system, the Train B CCW system may not be available. The Train A ESW system remains available to ensure operability of the Train A CCW system.
EJ	Residual Heat Removal System	M, H, P	Due to the potential loss of the Train B ESW system, the Train B RHR pump may not be available. The Train A ESW system remains available to ensure operability of the Train A RHR pump.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.

Table ESWB-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area ESWB

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
GD	ESW Pump House HVAC	S	Train B ESW pump room ventilation may be affected. Train A ESW pump room ventilation is unaffected.
GF	AFW Pump Room Coolers	S	Due to the potential loss of the Train B ESW system, the Train B MDAFP room cooler may not be available. The Train A ESW system remains available to ensure operability of the Train A MDAFP room cooler.
GK	Control Room and Class 1E Switchgear Room Coolers	S	Due to the potential loss of the Train B ESW system, the Train B Class 1E electrical equipment room cooler may not be available. The Train A ESW system remains available to ensure operability of the Train A Class 1E electrical equipment room cooler.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
GN	Containment Coolers	S	Due to the potential loss of the Train B ESW system, the Train B containment coolers may not be available. The Train A ESW system remains available to ensure operability of the Train A containment coolers.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
KJ	Standby Diesel Engine	S	The Train B diesel engine may be affected due to loss of Train B ESW. The Train A diesel generator is available.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.

Table ESWB-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area ESWB

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The Train B NB system is not directly affected by a fire in this area since off-site power remains available. However, due to the potential loss of the Train B Class 1E Electrical Equipment Room Cooler (due to the potential loss of Train B ESW), the NB02 switchgear room temperature could increase beyond that allowed for the equipment to remain functional. Therefore, it is assumed that NB02 is unavailable. If operators require NB02, then they can enter SYS GK-200 to provide cooling to the Train B electrical equipment rooms from Train A Class 1E A/C Unit SGK05A.
NE	Standby Diesel Generator	S	The Train B diesel generator may be affected due to loss of Train B ESW. The Train A diesel generator is available.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
NG	480V Load Centers and MCCs	S	Train B ESW pump room MCC NG06E may be affected. Train A ESW pump room MCC NG05E is unaffected. Train B 480 VAC Load Centers and MCCs could be affected due to loss of NB02 (See NB System Comments). Train A 480 VAC Load Centers and MCCs are unaffected.
NK	125VDC	S	Train B Class 1E 125 VDC distribution switchboards could be affected due to the potential loss of Train B Class 1E Electrical Equipment A/C unit SGK05B. Operators can enter SYS GK-200 to provide cooling to the Train B electrical equipment rooms from Train A Class 1E A/C Unit SGK05A.
NN	120VAC	S	Train B Class 1E 120 VAC distribution switchboards could be affected due to the potential loss of Train B Class 1E Electrical Equipment A/C unit SGK05B. Operators can enter SYS GK-200 to provide cooling to the Train B electrical equipment rooms from Train A Class 1E A/C Unit SGK05A.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.

Table ESWB-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area ESWB

System	System Name	PFSSD Function*	Comments
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area ESWB.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area ESWB. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Component Cooling Water

If Train B component cooling water (CCW) is operating at the time of the fire, it may be necessary to swap to Train A CCW due to the potential loss of Train B ESW.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in area ESWB.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area ESWB.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA ESWB

PFSSD components (S. in E-15000) located in fire area ESWB are shown in Table ESWB-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table ESWB-3.

Table ESWB-3
PFSSD Equipment Located in Fire Area ESWB

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
K104	DCGD01B	Train B ESW Pump Room Supply Fan Motor	5.1.1	
K104	DFEF01B	Train B ESW Traveling Water Screen Motor	5.1.1	
K104	DFEF02B	Train B ESW Self Cleaning Strainer	5.1.1	
K104	DPEF01B	Train B ESW Pump Motor	5.1.1	
K104	EF156	Train B ESW Control Panel	5.1.1	
K104	EFHIS0020	Train B ESW Self Cleaning Strainer HIS	5.1.1	
K104	EFHIS0004	Train B ESW Traveling Water Screen HIS	5.1.1	
K104	EFHIS0056B	Train B ESW Pump HIS	5.1.1	
K104	EFHIS0098	Train B ESW Pump A Air Release Valve HIS	5.1.1	
K104	EFHS0004	Train B ESW Traveling Water Screen Speed Selector Sw	5.1.1	
K104	EFHS0092	Train B ESW Traveling Water Screen Wash Valve Sw	5.1.1	
K104	EFHV0092	Train B ESW Screen Wash Water Valve	5.1.1	
K104	EFHV0098	Train B ESW Pump A Air Release Valve	5.1.1	
K104	EFPDS0020A	Train B ESW Self Cleaning Strainer dP Switch	5.1.1	
K104	EFPDV0020	Train B ESW Self Cleaning Strainer Trash Valve	5.1.1	
K104	EFPT0002	Train B ESW Pump Discharge Pressure	5.1.1	
K104	GDHIS0011B	Train B ESW Pump Room Supply Fan HIS	5.1.1	
K104	GDTE0011	Train B ESW Pump Room Supply Damper Temp Element	5.1.1	
K104	GDTZ0011A	Train B ESW Pump Room Supply Damper Actuator	5.1.1	
K104	GDTZ0011B	Train B ESW Pump Room Recirc Damper Actuator	5.1.1	
K104	GDTZ0011C	Train B ESW Pump Room Exhaust Damper Actuator	5.1.1	
K104	NG06E	Train B ESW Pump Room MCC	5.1.1	
K104	NG06EAF1	NG06E Incoming Line from NB02	5.1.1	
K104	NG06EBF2	Distribution Panel	5.1.1	

Table ESWB-3
PFSSD Equipment Located in Fire Area ESWB

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
K104	NG06ECF1	Relay Panel	5.1.1	
K104	NG06EDF2	Train B ESW Screen Wash Water Valve	5.1.1	
K104	NG06EDF3	Train B ESW Pump A Air Release Valve	5.1.1	
K104	NG06EDF4	Train B ESW Traveling Water Screen Motor	5.1.1	
K104	NG06EEF3	Train B ESW Self Cleaning Strainer Trash Valve	5.1.1	
K104	NG06EEF4	Train B ESW Pump Room Supply Fan Motor	5.1.1	
K104	NG06EFF3	Train B ESW Self Cleaning Strainer	5.1.1	
K104	TBK0203	Terminal Box	5.1.1	
K104	XNG06	Train B ESW Pump Room MCC Transformer	5.1.1	

5.1.1 Train B Essential Service Water (ESW)

This fire area contains equipment and cables associated with the Train B ESW system. Consequently, a fire in this area could result in a loss of Train B ESW, as well as all supported equipment. PFSSD equipment (excluding supported equipment) that requires Train B ESW is as follows:

- Train B containment air coolers
- Train B electrical penetration room cooler
- Train B component cooling water (CCW) pump room cooler
- Train B residual heat removal pump room cooler
- Train B centrifugal charging pump room cooler
- Train B class 1E electrical equipment A/C unit
- Train B control room A/C unit
- Train B motor driven auxiliary feedwater pump room cooler
- Train B auxiliary feedwater pump alternate supply (Note: condensate storage tank (CST) remains available)
- Turbine driven auxiliary feedwater pump alternate supply (Note: CST and Train B ESW remain available)
- Train B CCW heat exchanger
- Train B emergency diesel engine coolers

Loss of Train B ESW causes a loss of a number of Train B components. Therefore, Train B is not available in the event of a fire in the Train B ESW pump room. Train A ESW is unaffected and remains available to supply redundant Train A PFSSD equipment.

Based on the above discussion, a fire in area ESWB which affects the Train B ESW pump will not adversely impact the ability to safely shut down.

References: E-15000, XX-E-013, E-K3EF01, E-K3EF02, E-K3EF03, E-K3EF04, E-K3EF05, E-K3EF06, E-K3EF08, E-K3EF11, E-K3GD01A, E-K3GD03, E-K3GD04, E-K3GD04A, E-K3NG01, E-K3NG10, M-12AL01, M-12EF01, M-12EF02, MK2EF01, M-12EG02, M-12GF01, M-12GK01, M-12GK03, M-12GL01, M-12GN01, M-12KJ01, M-K2GD01

5.2 PFSSD CABLE EVALUATION

Table ESWB-4 lists all the PFSSD cables (S. in E-15000) located in fire area ESWB. The applicable evaluation section is also listed in Table ESWB-4.

All PFSSD cables that run in Fire Area ESWB terminate at their associated PFSSD equipment within Fire Area ESWB. Therefore, all cable evaluations are included with the equipment evaluations in Section 5.1. Any possible combination of hot shorts, open circuits or shorts to ground could prevent operation or cause mal-operation of the associated Train B equipment. Cables associated with redundant Train A equipment are unaffected and therefore PFSSD can be achieved.

Table ESWB-4
PFSSD Cables Located in Fire Area ESWB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EFB01SB	K104	DPEF01B	P	5.1.1	ESW Pump B Motor
14EFB01SE	K104	DPEF01B	P	5.1.1	ESW Pump B Motor
14EFB01SF	K104	DPEF01B	P	5.1.1	ESW Pump B Motor
14EFG02SA	K104	DFEF01B	P	5.1.1	Train B ESW Traveling Water Screen Motor
14EFG02SB	K104	DFEF01B	P	5.1.1	Train B ESW Traveling Water Screen Motor
14EFG02SC	K104	DFEF01B	C	5.1.1	Train B ESW Traveling Water Screen Motor
14EFG02SD	K104	DFEF01B	C	5.1.1	Train B ESW Traveling Water Screen Motor
14EFG02SE	K104	DFEF01B	C	5.1.1	Train B ESW Traveling Water Screen Motor
14EFG02SF	K104	DFEF01B	C	5.1.1	Train B ESW Traveling Water Screen Motor
14EFG03SA	K104	EFHV0092	P	5.1.1	Train B ESW Screen Wash Water Valve
14EFG03SB	K104	EFHV0092	C	5.1.1	Train B ESW Screen Wash Water Valve
14EFG03SC	K104	EFHV0092	C	5.1.1	Train B ESW Screen Wash Water Valve
14EFG03SD	K104	EFHV0092	C	5.1.1	Train B ESW Screen Wash Water Valve
14EFG04SA	K104	DFEF02B	P	5.1.1	Train B ESW Self Cleaning Strainer
14EFG04SB	K104	DFEF02B	C	5.1.1	Train B ESW Self Cleaning Strainer
14EFG04SD	K104	DFEF02B	C	5.1.1	Train B ESW Self Cleaning Strainer
14EFG04SF	K104	DFEF02B	C	5.1.1	Train B ESW Self Cleaning Strainer
14EFG05SA	K104	EFPDV0020	P	5.1.1	Train B ESW Self Cleaniing Strainer Trash Valve
14EFG05SB	K104	EFPDV0020	C	5.1.1	Train B ESW Self Cleaniing Strainer Trash Valve
14EFG06SA	K104	EFHV0098	P	5.1.1	Train B ESW Pump Air Release Valve
14EFG06SB	K104	EFHV0098	C	5.1.1	Train B ESW Pump Air Release Valve

Table ESWB-4
PFSSD Cables Located in Fire Area ESWB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14EFG06SC	K104	EFHV0098	C	5.1.1	Train B ESW Pump Air Release Valve
14EFG06SD	K104	EFHV0098	C	5.1.1	Train B ESW Pump Air Release Valve
14EFG11SA	K104	DCGD01B	C	5.1.1	Train B ESW Pump Room Supply Fan Motor
14EFG11TA	K104	DCGD01B	C	5.1.1	Train B ESW Pump Room Supply Fan Motor
14EFI08RB	K104	EFPT0002	I	5.1.1	Train B ESW Pump Discharge Pressure
14EFK01SA	K104	DPEF01B	C	5.1.1	Train B ESW Pump Control HIS and Interposing Relays
14GDG01BA	K104	DCGD01B	P	5.1.1	Train B ESW Pump Room Supply Fan
14GDG01BB	K104	DCGD01B	C	5.1.1	Train B ESW Pump Room Supply Fan
14GDG01BD	K104	DCGD01B	C	5.1.1	Train B ESW Pump Room Supply Fan
14GDG01BG	K104	DCGD01B	C	5.1.1	Train B ESW Pump Room Supply Fan
14GDI04BA	K104	GDTE0011	I	5.1.1	Train B ESW Pump Room Temperature Element
14GDI04BB	K104	GDTZ0011A	I	5.1.1	Train B ESW Pump Room Inlet Damper
14GDI04BC	K104	GDTZ0011B	I	5.1.1	Train B ESW Pump Room Recirc Damper
14GDY01BA	K104	DCGD01B	C	5.1.1	Train B ESW Pump Room Supply Fan
14GDY03BA	K104	GDTZ0011C	P	5.1.1	Train B ESW Pump Room Exhaust Damper Actuator
14GDY04CA	K104	GDTZ0011A	P	5.1.1	Train B ESW Pump Room Supply Damper Actuator
14GDY04DA	K104	GDTZ0011B	P	5.1.1	Train B ESW Pump Room Recirc. Damper Actuator
14NGB10SB	K104	NB0216	P	5.1.1	NB0216 Overcurrent Protection
14NGG01SA	K104	NG06E	P	5.1.1	4.16 kV Power from NB0116 to XNG05

Table ESWB-4
PFSSD Cables Located in Fire Area ESWB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14NGG01SB	K104	NG06E	P	5.1.1	480 V Power from XNG05 to NG05E
14NGG01SD	K104	NG06E	P	5.1.1	XNG05 Time Overcurrent Relay

FIRE AREA ESWV

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1.0 GENERAL AREA DESCRIPTION

Fire area ESWV consists of the essential service water pumphouse vaults and includes the rooms listed in Table ESWV-1.

Table ESWV-1
Rooms Located in Fire Area ESWV

ROOM #	DESCRIPTION
Z118A/AV1	ESW Access Vault
Z118B/AV2	ESW Access Vault
Z118C/AV3	ESW Access Vault
Z118D/AV4	ESW Access Vault
Z118E/AV5	ESW Access Vault
Z118F/AV6	ESW Access Vault

Fire area ESWV has no automatic suppression or detection installed.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Fire area ESWV contains no post-fire safe shutdown cables or equipment. Therefore, both trains of PFSSD equipment are available if a fire occurs in this area.

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

Not applicable to fire area ESWV.

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

A detailed analysis is not required since this area contains no PFSSD cables or components.

FIRE AREA F-1

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area F-1 is located on the 2000, 2032 and 2047 elevations of the Fuel Building and includes the rooms listed in Table F-1-1.

Table F-1-1
Rooms Located in Fire Area F-1

ROOM #	DESCRIPTION
6101	Stair F-1
6102	Laydown Area 2000 El
6103	Cask Loading Pool 2000 El
6106	Spent Fuel Pool and Storage Racks
6201	Passage
6204	Cask Washdown Pit
6205	Fuel Transfer Canal
6210	New Fuel Storage Area
6301	General Floor Area 2047 El
6302	Laydown Area 2047 El

Fire area F-1 is protected with an automatic pre-action sprinkler system in the Laydown Area on the 2000 elevation. In addition, thermal fire detectors are installed in the Laydown Area and infrared fire detectors are installed to detect fires on the 2047 elevation.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table F-1-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the potential fire impact on some of the more significant PFSSD equipment, see Section 8.0 of the Fire Area Analysis Narrative section.

Table F-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-1

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
BN	Borated Refueling Water Storage System	R, M, H	Level transmitters BNLT0930 and BNLT0931 may be affected, causing a spurious low-low level RWST signal. A SIS is not credible if a fire occurs in this area so containment sump isolation valves will not open and the RWST will not drain to the sump.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.

Table F-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-1

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.

Table F-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-1

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.

Table F-1-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-1			
System	**System Name**	**PFSSD Function***	**Comments**
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-1.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area F-1. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area F-1.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA F-1

There are no PFSSD components (S. in E-15000) located in fire area F-1. This fire area only contains PFSSD cables associated with components located in other fire areas.

5.2 PFSSD CABLE EVALUATION

Table F-1-3 lists all the PFSSD cables (S. in E-15000) located in fire area F-1. The applicable evaluation section is also listed in Table F-1-3.

Table F-1-3
PFSSD Cables Located in Fire Area F-1

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BNI07CA	6301	BNLT0930	I	5.2.1	RWST Level Transmitter
12BNI07DA	6301	BNLT0931	I	5.2.1	RWST Level Transmitter

5.2.1 Refueling Water Storage Tank

The RWST is credited in the PFSSD analysis as the primary source of borated water to achieve cold shutdown. The Wolf Creek Technical Specifications ensure the minimum quantity and boron concentration is maintained to achieve cold shutdown. Therefore, RWST level transmitters, indicators and circuits are not evaluated for level indication.

The RWST level transmitters and associated circuits are included in the PFSSD analysis because of the automatic functions they perform. A low-low level in the RWST on 2 out of 4 RWST level transmitters, coincident with a safety injection signal, will provide a permissive for containment sump isolation valves EJHV8811A and EJHV8811B to open. This could cause the RWST to drain to the containment sump if the associated RWST to RHR valve does not close.

Cables associated with refueling water storage tank (RWST) level transmitters BNLT0930 and BNLT0931 are run in fire area F-1. Damage to these cables could initiate a spurious low-low RWST level signal. A spurious SIS is not credible if a fire occurs in area F-1. Therefore, the open permissive will not occur for valves EJHV8811A and EJHV8811B. Consequently, a spurious RWST draindown is not credible if a fire occurs in this area.

Based on the above discussion, the RWST is available if a fire occurs in area F-1.

References: E-15000, XX-E-013, E-13BN07, E-13EJ06A, E-13EJ06B, E-1F9102, E-1F9205, E-1F9302, M-10EJ, M-12BN01, M-12EJ01, M-767-00162, M-767-00165, M-767-00168, M-767-00189

FIRE AREA F-2

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1.0 GENERAL AREA DESCRIPTION

Fire area F-2 is located on the 2000 elevation of the Fuel Building and includes the room listed in Table F-2-1.

Table F-2-1
Rooms Located in Fire Area F-2

ROOM #	DESCRIPTION
6104	Fuel Pool Cooling Heat Exchanger Room West

Fire area F-2 is protected with an automatic smoke detection system throughout. There is no automatic suppression installed. The area is separated from all adjacent areas by minimum 3-hour fire resistant rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table F-2-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the potential fire impact on some of the more significant PFSSD equipment, see Section 8.0 of the Fire Area Analysis Narrative section.

Table F-2-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-2

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
BN	Borated Refueling Water Storage System	R, M, H	All four RWST level transmitters may be affected if a fire occurs in this area. This is acceptable as discussed in Section 5.2.1.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.

Table F-2-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-2

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.

Table F-2-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-2

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
PA	13.8kV	S	Load center feeder breaker PA0206 could be affected. Redundant capability is available.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.

Table F-2-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-2			
System	**System Name**	**PFSSD Function***	**Comments**
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-2.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area F-2. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area F-2.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA F-2

There are no PFSSD components (S. in E-15000) located in fire area F-2. This fire area only contains PFSSD cables associated with components located in other fire areas.

5.2 PFSSD CABLE EVALUATION

Table F-2-3 lists all the PFSSD cables (S. in E-15000) located in fire area F-2. The applicable evaluation section is also listed in Table F-2-3.

Table F-2-3
PFSSD Cables Located in Fire Area F-2

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BNI07CA	6104	BNLT0930	I	5.2.1	RWST Level Transmitter
12BNI07DA	6104	BNLT0931	I	5.2.1	RWST Level Transmitter
13BNI07EC	6104	BNLT0932	I	5.2.1	RWST Level Transmitter
14BNI07FA	6104	BNLT0933	I	5.2.1	RWST Level Transmitter
16PGA10CA	6104	PA0206	C	5.2.2	Load Centers PG12, PG16 and PG26 Fdr Bkr

5.2.1 Refueling Water Storage Tank

The RWST is credited in the PFSSD analysis as the primary source of borated water to achieve cold shutdown. The Wolf Creek Technical Specifications ensure the minimum quantity and boron concentration is maintained to achieve cold shutdown. Therefore, RWST level transmitters, indicators and circuits are not evaluated for level control.

The RWST level transmitters and associated circuits are included in the PFSSD analysis because of the automatic functions they perform. A low-low level in the RWST on 2 out of 4 RWST level transmitters, coincident with a safety injection signal, will provide a permissive for containment sump isolation valves EJHV8811A and EJHV8811B to open. This could cause the RWST to drain to the containment sump if the associated RWST to RHR valve does not close.

Cables associated with all four RWST level transmitters are run in this area. Damage to these cables could initiate a spurious low-low RWST level signal. A spurious SIS is not credible if a fire occurs in area F-2. Therefore, the open permissive will not occur for valves EJHV8811A and EJHV8811B. Consequently, a spurious RWST draindown is not credible if a fire occurs in this area.

Based on the above discussion, there is reasonable assurance that the RWST will be available if a fire occurs in area F-2.

References: E-15000, XX-E-013, E-13BN07, E-13EJ06A, E-13EJ06B, E-1F9102, E-1F9201, E-1F9205, E-1F9302, M-12BN01, M-12EJ01, M-767-00162, M-767-00165, M-767-00168, M-767-00189

5.2.2 Load Center Feeder Breaker PA0206

Load center feeder breaker PA0206 is credited for PFSSD because it supplies power to credited non-safety related loads. Cable 16PGA10CA is a control cable associated with breaker PA0206. An intra-cable hot short in this cable will trip PA0206. Breaker PA0206 supplies power to the following PFSSD components:

- PG12KAF4 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0032
- PG12KAF5 – Main Steam Supply to Steam Seals Valve ABHV0046
- PG12KEF3 – Auxiliary Steam System Control Valve FBHV0080

PG12KAF4, PG12KAF5 and PG12KEF3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using either hand switch ABHS0079 or ABHS0080. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Based on the above discussion, loss of breaker PA0206 due to a fire in area F-2 will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-13PG10, E-1F9424E

FIRE AREA F-3

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1.0 GENERAL AREA DESCRIPTION

Fire area F-3 is located on the 2000 elevation of the Fuel Building and includes the room listed in Table F-3-1.

Table F-3-1
Rooms Located in Fire Area F-3

ROOM #	DESCRIPTION
6105	Train A Fuel Pool Cooling Heat Exchanger Room

Fire area F-3 is protected with automatic smoke detection. The area is separated on all sides by minimum 3-hour fire resistance rated barriers.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Fire area F-3 contains no post-fire safe shutdown cables or equipment. Therefore, both trains of PFSSD equipment are available if a fire occurs in this area.

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

Not applicable to fire area F-3.

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

A detailed analysis is not required since this area contains no PFSSD cables or components.

FIRE AREA F-4

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area F-4 is located on the 2026 elevation of the Fuel Building and includes the room listed in Table F-4-1.

Table F-4-1
Rooms Located in Fire Area F-4

ROOM #	DESCRIPTION
6203	Air Handling Equipment Room

Fire area F-4 is protected with an automatic smoke detection system throughout. There is no automatic suppression installed. The area is separated from all adjacent areas by minimum 3-hour fire resistant rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table F-4-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the potential fire impact on some of the more significant PFSSD equipment, see Section 8.0 of the Fire Area Analysis Narrative section.

Table F-4-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-4

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
BN	Borated Refueling Water Storage System	R, M, H	Level transmitter BNLT0933 may be affected. Level transmitters BNLT0930, BNLT0931 and BNLT0932 are available.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.

Table F-4-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-4

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.

Table F-4-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-4

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
PA	13.8kV	S	Load center feeder breaker PA0105 could be affected. Redundant capability is available.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.

Table F-4-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-4			
System	**System Name**	**PFSSD Function***	**Comments**
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-4.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area F-4. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area F-4.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA F-4

There are no PFSSD components (S. in E-15000) located in fire area F-4. This fire area only contains PFSSD cables associated with components located in other fire areas.

5.2 PFSSD CABLE EVALUATION

Table F-4-3 lists all the PFSSD cables (S. in E-15000) located in fire area F-4. The applicable evaluation section is also listed in Table F-4-3.

Table F-4-3
PFSSD Cables Located in Fire Area F-4

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14BNI07FA	6203	BNLT0933	I	5.2.1	RWST Level Transmitter
15PGA10AA	6203	PA0105	C	5.2.2	Load Centers PG11, PG13 and PG25 Fdr Bkr

5.2.1 Refueling Water Storage Tank

The RWST is credited in the PFSSD analysis as the primary source of borated water to achieve cold shutdown. The Wolf Creek Technical Specifications ensure the minimum quantity and boron concentration is maintained to achieve cold shutdown. Therefore, RWST level transmitters, indicators and circuits are not evaluated for level control.

The RWST level transmitters and associated circuits are included in the PFSSD analysis because of the automatic functions they perform. A low-low level in the RWST on 2 out of 4 RWST level transmitters, coincident with a safety injection signal, will provide a permissive for containment sump isolation valves EJHV8811A and EJHV8811B to open. This could cause the RWST to drain to the containment sump if the associated RWST to RHR valve does not close.

A cable associated with refueling water storage tank (RWST) level transmitter BNLT0933 runs in fire area F-4. Cables for the remaining three RWST level transmitters are unaffected. Therefore, a spurious low-low level in the RWST is not credible if a fire occurs in this area.

Based on the above discussion, the RWST is available if a fire occurs in area F-4.

References: E-15000, XX-E-013, E-13BN07, E-13EJ06A, E-13EJ06B, E-1F9102, E-1F9201, E-1F9205, E-1F9302, M-12BN01, M-12EJ01, M-767-00162, M-767-00165, M-767-00168, M-767-00189

5.2.2 Load Center Feeder Breaker PA0105

Load center feeder breaker PA0105 is credited for PFSSD because it supplies power to credited non-safety related loads. Cable 15PGA10AA associated with PA0105 is run in this area. A fire induced short circuit in this cable will trip breaker PA0105.

Breaker PA0105 supplies power to the following PFSSD components:

- PG11JFR2 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0031
- PG11KBR3 – Auxiliary Steam System Control Valve FBHV0081

PG11JFR2 and PG11KBR3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using hand switch ABHS0079. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Based on the above discussion, loss of breaker PA0105 will not adversely affect PFSSD if a fire occurs in this area.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-13PG10, E-1F9424E, KD-7496

FIRE AREA F-5

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area F-5 is located on the 2026 elevation of the Fuel Building and includes the room listed in Table F-5-1.

Table F-5-1
Rooms Located in Fire Area F-5

ROOM #	DESCRIPTION
6202	Electrical Equipment Room

Fire area F-5 is protected with an automatic smoke detection system throughout. There is no automatic suppression installed. The area is separated from all adjacent areas by minimum 3-hour fire resistant rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table F-5-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the potential fire impact on some of the more significant PFSSD equipment, see Section 8.0 of the Fire Area Analysis Narrative section.

Table F-5-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-5

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
BN	Borated Refueling Water Storage System	R, M, H	All four RWST level transmitters may be affected if a fire occurs in this area. This is acceptable as discussed in Section 5.2.1.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.

Table F-5-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-5

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.

Table F-5-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-5

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
PA	13.8kV	S	Load center feeder breakers PA0105 and PA0206 could be affected. Redundant capability is available.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.

Table F-5-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-5			
System	**System Name**	**PFSSD Function***	**Comments**
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-5.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area F-5. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area F-5.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA F-5

There are no PFSSD components (S. in E-15000) located in fire area F-5. This fire area only contains PFSSD cables associated with components located in other fire areas.

5.2 PFSSD CABLE EVALUATION

Table F-5-3 lists all the PFSSD cables (S. in E-15000) located in fire area F-5. The applicable evaluation section is also listed in Table F-5-3.

Table F-5-3
PFSSD Cables Located in Fire Area F-5

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BNI07CA	6202	BNLT0930	I	5.2.1	RWST Level Transmitter
12BNI07DA	6202	BNLT0931	I	5.2.1	RWST Level Transmitter
13BNI07EC	6202	BNLT0932	I	5.2.1	RWST Level Transmitter
14BNI07FA	6202	BNLT0933	I	5.2.1	RWST Level Transmitter
15PGA10AA	6202	PA0105	C	5.2.2	Load Centers PG11, PG13 and PG25 Fdr Bkr
16PGA10CA	6202	PA0206	C	5.2.2	Load Centers PG12, PG16 and PG26 Fdr Bkr

5.2.1 Refueling Water Storage Tank

The RWST is credited in the PFSSD analysis as the primary source of borated water to achieve cold shutdown. The Wolf Creek Technical Specifications ensure the minimum quantity and boron concentration is maintained to achieve cold shutdown. Therefore, RWST level transmitters, indicators and circuits are not evaluated for level control.

The RWST level transmitters and associated circuits are included in the PFSSD analysis because of the automatic functions they perform. A low-low level in the RWST on 2 out of 4 RWST level transmitters, coincident with a safety injection signal, will provide a permissive for containment sump isolation valves EJHV8811A and EJHV8811B to open. This could cause the RWST to drain to the containment sump if the associated RWST to RHR valve does not close.

Cables associated with all four RWST level transmitters are run in this area. Damage to these cables could initiate a spurious low-low RWST level signal. A spurious SIS is not credible if a fire occurs in area F-5. Therefore, the open permissive will not occur for valves EJHV8811A and EJHV8811B. Consequently, a spurious RWST draindown is not credible if a fire occurs in this area.

Based on the above discussion, there is reasonable assurance that the RWST will be available if a fire occurs in area F-5.

References: E-15000, XX-E-013, E-13BN07, E-13EJ06A, E-13EJ06B, E-1F9102, E-1F9201, E-1F9205, E-1F9302, M-12BN01, M-12EJ01, M-767-00162, M-767-00165, M-767-00168, M-767-00189

5.2.2 Load Center Feeder Breakers PA0105 and PA0206

Load center feeder breakers PA0105 and PA0206 are credited for PFSSD because they supply power to credited non-safety related loads.

Cable 15PGA10AA associated with PA0105 is run in this area. A fire induced short circuit in this cable will trip breaker PA0105.

Breaker PA0105 supplies power to the following PFSSD components:

- PG11JFR2 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0031
- PG11KBR3 – Auxiliary Steam System Control Valve FBHV0081

PG11JFR2 and PG11KBR3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using hand switch ABHS0079. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Cable 16PGA10CA is a control cable associated with breaker PA0206. An intra-cable hot short in this cable will trip PA0206.

Breaker PA0206 supplies power to the following PFSSD components:

- PG12KAF4 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0032
- PG12KAF5 – Main Steam Supply to Steam Seals Valve ABHV0046
- PG12KEF3 – Auxiliary Steam System Control Valve FBHV0080

PG12KAF4, PG12KAF5 and PG12KEF3 supply power to components downstream of the MSIVs. The MSIVs are unaffected by a fire in this area and can be closed from the control room using either hand switch ABHS0079 or ABHS0080. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Based on the above discussion, loss of breakers PA0105 and PA0206 due to a fire in area F-5 will not adversely impact PFSSD.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-13PG10, E-1F9424E, KD-7496

FIRE AREA F-6

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1.0 GENERAL AREA DESCRIPTION

Fire area F-6 is located on the 2047 elevation of the Fuel Building and includes the room listed in Table F-6-1.

Table F-6-1
Rooms Located in Fire Area F-6

ROOM #	DESCRIPTION
6304	Train A Emergency Exhaust Fitler Absorber Room

Fire area F-6 is protected with automatic smoke detection. The area is separated on all sides by minimum 3-hour fire resistance rated barriers.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Fire area F-6 contains no post-fire safe shutdown cables or equipment. Therefore, both trains of PFSSD equipment are available if a fire occurs in this area.

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

Not applicable to fire area F-6.

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

A detailed analysis is not required since this area contains no PFSSD cables or components.

FIRE AREA F-7

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area F-7 is located on the 2047 elevation of the Fuel Building and includes the room listed in Table F-7-1.

Table F-7-1
Rooms Located in Fire Area F-7

ROOM #	DESCRIPTION
6303	Emergency Exhaust Equipment Room West

Fire area F-7 is protected with an automatic smoke detection system throughout. There is no automatic suppression installed. The area is separated from all adjacent areas by minimum 3-hour fire resistant rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table F-7-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the potential fire impact on some of the more significant PFSSD equipment, see Section 8.0 of the Fire Area Analysis Narrative section.

Table F-7-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-7

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
BN	Borated Refueling Water Storage System	R, M, H	RWST level transmitters BNLT0930, BNLT0931 and BNLT0932 may be affected. RWST level transmitter BNLT0933 is unaffected.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.

Table F-7-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-7

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.

Table F-7-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-7

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.

Table F-7-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area F-7			
System	**System Name**	**PFSSD Function***	**Comments**
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area F-7.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area F-7. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area F-7.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA F-7

There are no PFSSD components (S. in E-15000) located in fire area F-7. This fire area only contains PFSSD cables associated with components located in other fire areas.

5.2 PFSSD CABLE EVALUATION

Table F-7-3 lists all the PFSSD cables (S. in E-15000) located in fire area F-7. The applicable evaluation section is also listed in Table F-7-3.

Table F-7-3
PFSSD Cables Located in Fire Area F-7

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BNI07CA	6303	BNLT0930	I	5.2.1	RWST Level Transmitter
12BNI07DA	6303	BNLT0931	I	5.2.1	RWST Level Transmitter
13BNI07EC	6303	BNLT0932	I	5.2.1	RWST Level Transmitter

5.2.1 Refueling Water Storage Tank

The RWST is credited in the PFSSD analysis as the primary source of borated water to achieve cold shutdown. The Wolf Creek Technical Specifications ensure the minimum quantity and boron concentration is maintained to achieve cold shutdown. Therefore, RWST level transmitters, indicators and circuits are not evaluated for level control.

The RWST level transmitters and associated circuits are included in the PFSSD analysis because of the automatic functions they perform. A low-low level in the RWST on 2 out of 4 RWST level transmitters, coincident with a safety injection signal, will provide a permissive for containment sump isolation valves EJHV8811A and EJHV8811B to open. This could cause the RWST to drain to the containment sump if the associated RWST to RHR valve does not close.

Cables associated with three of four RWST level transmitters are run in this area. Damage to these cables could initiate a spurious low-low RWST level signal. A spurious SIS is not credible if a fire occurs in area F-7. Therefore, the open permissive will not occur for valves EJHV8811A and EJHV8811B. Consequently, a spurious RWST draindown is not credible if a fire occurs in this area.

Based on the above discussion, there is reasonable assurance that the RWST will be available if a fire occurs in area F-7.

References: E-15000, XX-E-013, E-13BN07, E-13EJ06A, E-13EJ06B, E-1F9102, E-1F9201, E-1F9205, E-1F9302, M-12BN01, M-12EJ01, M-767-00162, M-767-00165, M-767-00168, M-767-00189

FIRE AREA HMS-1

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1.0 GENERAL AREA DESCRIPTION

Fire area HMS-1 is located on the 2000 elevation of the Auxiliary Building and includes the room listed in Table HMS-1-1.

Table HMS-1-1
Rooms Located in Fire Area HMS-1

ROOM #	DESCRIPTION
1332	Hot Machine Shop
1333	Decontamination Room
1334	Hot Instrument Shop

Fire area HMS-1 is protected with automatic smoke detection. The area is separated on all sides by minimum 3-hour fire resistance rated barriers.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Fire area HMS-1 contains no post-fire safe shutdown cables or equipment. Therefore, both trains of PFSSD equipment are available if a fire occurs in this area.

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

Not applicable to fire area HMS-1.

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

A detailed analysis is not required since this area contains no PFSSD cables or components.

FIRE AREA RB

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

The Reactor Building is divided into 11 fire areas as described in Table RB-1.

Table RB-1
Fire Areas Located Inside the Reactor Building

FIRE AREA	DESCRIPTION
RB-1	Area within the secondary shield wall, elevation 2000-0
RB-2	Area outside the secondary shield wall, elevation 2000-0
RB-3	North electrical penetration area, elevation 2026-0
RB-4	South electrical penetration area, elevation 2026-0
RB-5	Cable tray area, elevation 2047-6
RB-6	Reactor building elevation 2068-8
RB-7	West area, elevation 2026-0
RB-8	East area, elevation 2026-0
RB-9	Tendon access gallery
RB-10	Reactor building, elevation 2047-6 except cable tray area
RB-11	Area within primary shield wall

There are no physical barriers within the reactor building meeting the requirements of 10CFR50, Appendix R Section III.G.2.a. There are, however, substantial concrete barriers that would likely resist the spread of fire between adjacent sides. Separation of redundant PFSSD cables and equipment within non-inerted containments is required to meet one of the following requirements of Appendix R Section III.G.2:

III.G.2.d *Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards;*

III.G.2.e *Installation of fire detectors and an automatic fire suppression system in the fire area; or*

III.G.2.f *Separation of cables and equipment and associated non-safety circuits of redundant trains by a non-combustible radiant energy shield.*

Fire areas RB-3 and RB-4 have automatic fire detection and a fixed, manually charged fire suppression system installed. Each manually charged fire suppression system is comprised of closed sprinkler heads installed over cable tray concentrations in the area. Each fire detection system consists of line-type fire detection installed in the vicinity of the cable trays. Actuation of the fire detection system will alert operators of a fire in the area, and the sprinkler system piping can be charged by manually opening valves KCV0427 in the North pipe penetration room and KCHV0253 from the control room. This configuration was approved by the NRC in the SER and meets the intent of Appendix R, Section III.G.2.e stated above.

Each RCP is provided with an oil collection system meeting the Wolf Creek commitments to 10CFR50, Appendix R Section III.O. Linear heat detection is also installed above each reactor coolant pump (RCP). During power operation, fire hazards within the reactor building are limited to cables and lubricants contained within valve operators and motors and that allowed by administrative procedures. Cables are run in conduits and cable trays throughout the building.

Many of the cable trays are provided with metal covers on the top and/or bottom, which function to limit fire hazard potential of the enclosed cables. Cables are IEEE 383 rated, which are combustible, but tests have shown will self-extinguish if the ignition source is removed.

Eleven (11) fire detection zones are provided in containment. Each zone, when actuated, annunciates a specific location description in the control room which allows operators to identify the approximate location of the fire.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table RB-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table RB-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RB

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB. All three steam generator pressure indicators on all four steam generators are available.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
AE	Main Feedwater	H, P	All PFSSD functions associated with the main feedwater system are satisfied. Steam generator level indication on at least two steam generators is available. See Section 5.1.9 for details.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
BB	Reactor Coolant System	R, M, H, P, S	All PFSSD functions associated with the reactor coolant system are satisfied. Loss of inventory through the head vent valves is prevented by maintaining valves BBHV8001A and either BBHV8001B or BBHV8002B closed. Pressurizer level indication is available using BBLI0460A unless a fire alarm is indicated on alarm windows 138, 139 or 148. If this is the case, then monitor BBLI0459A, BBLI0460A, BBLI0461 and BBLI0462 to determine an accurate level reading. At least three of these indicators should trend the same. Pressurizer pressure indication is available using BBPI0456 unless a fire alarm is indicated on alarm windows 138, 139 or 148. If this is the case, then monitor BBPI0455A, BBPI0456, BBPI0457 and BBPI0458 to determine an accurate pressure reading. At least three of these indicators should trend the same. A spurious SIS due to low pressurizer pressure on two out of four pressurizer pressure transmitters is mitigated by entering the EMG procedure network and, if necessary, placing EMHIS0004 and EMHIS0005 in pull-to-lock. When transferring to RHR, valves BBPV8702A or BBPV8702B may need to be manually opened to provide a suction source from the RCS to RHR pump A or B. It is expected that the fire will be extinguished, and the smoke cleared before this action is necessary. RCP thermal barrier cooling could be affected due to spurious closure of BBHV0013, BBHV0014, BBHV0015 and BBHV0016. All four reactor coolant pumps may not stop using the control room hand switch. RCP seal injection remains available. Therefore, the inability to stop the RCPs will have no adverse impact on PFSSD. Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, pressurizer spray can be stopped by closing KAFV0029 using KAHIS0029 in the main control room.

Table RB-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RB

System	System Name	PFSSD Function*	Comments
BG	Chemical and Volume Control System	R, M, S	All PFSSD functions associated with the chemical and volume control system are satisfied. A spurious opening of the excess letdown isolation valves can be mitigated by opening breaker NK4119 to fail close valves BGHV8153A and BGHV8154A and opening breaker NK4407 to fail close valves BGHV8153B and BGHV8154B. Breaker NK4119 is located in fire area C-16 and breaker NK4407 is located in fire area C-15. Letdown isolation valves BGLCV0459 and BGLCV0460 and letdown orifice valves BGHV8149A, BGHV8149B, and BGHV8149C may need to be failed closed by closing valve KAFV0029 using KAHIS0029 in the main control room.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
EF	Essential Service Water System	H, S	All PFSSD functions associated with the essential service water system are satisfied. Essential service water flow to the containment coolers is available by using either Train A or Train B containment isolation valves (EFHVXXXX).
EG	Component Cooling Water System	S	CCW flow to the RCP thermal barriers could be affected due to spurious closure of EGHV0062 and EGHV0132 and as discussed in BB System comments above. CCW flow indicators EGFI0128 and EGFI0129 are unaffected.
EJ	Residual Heat Removal System	M, H, P	All PFSSD functions associated with the residual heat removal system are satisfied. Draindown of the RCS and RWST to the containment sump is prevented by maintaining valves EJHV8811A and EJHV8811B closed. When transferring to RHR, valves EJHV8701A or EJHV8701B may need to be manually opened to provide a suction source from the RCS to RHR pump A or B. It is expected that the fire will be extinguished, and the smoke cleared before this action is necessary.
EM	High Pressure Coolant Injection	R, M	All PFSSD functions associated with the high-pressure coolant injection system are satisfied. A spurious start of the SI Pumps due to 2/4 low pressurizer pressure signals can be mitigated by entering the EMG procedure network and placing the pump control hand switches EMHIS0004 and EMHIS0005 on panel RL017 in pull-to-lock. Valve EMHV8964 is available to prevent loss of charging flow through the SIS test line.

Table RB-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RB

System	System Name	PFSSD Function*	Comments
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
EP	Safety Injection Accumulators	H	A containment entry may be required to close EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D prior to the RCS reaching 1000 psig.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
GN	Containment Coolers	S	The PFSSD Support function associated with the Containment Coolers is satisfied. Either the Train A or Train B containment coolers are available, depending on the location of the fire. Containment pressure indicators GNPI0934, GNPI0935, GNPI0936 and GNPI0937 are available.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.

Table RB-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RB

System	System Name	PFSSD Function*	Comments
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.

Table RB-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RB

System	System Name	PFSSD Function*	Comments
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
SE	Ex-Core Neutron Monitoring	R, P	All PFSSD functions associated with the ex-core neutron monitoring system are satisfied. Source range monitoring is available using any available detector (SE02, SE04, SE06 or SE08), depending on the location of the fire.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RB.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area RB. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are generally described in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

Operator Manual Actions (OMAs) are those actions outside the main control room required to achieve and maintain hot standby. OMAs are identified in E-1F9900 and were determined from thermal hydraulic analysis WCNOC-CP-002. Applicable E-1F9900 OMAs are annotated herein. All other actions outside the control room are desirable for plant control in support of hot standby but not required to achieve and maintain hot standby.

3.1.1 Excess Letdown Isolation Valves

A spurious opening of the excess letdown isolation valves can be mitigated by opening breaker NK4119 to fail close valves BGHV8153A and BGHV8154A and opening breaker NK4407 to fail close valves BGHV8153B and BGHV8154B. Breaker NK4119 is located in fire area C-16 and breaker NK4407 is located in fire area C-15.

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 Safety Injection

A spurious Safety Injection Signal (SIS) can be mitigated by consulting EMG E-0 and terminating the spurious SIS.

3.2.2 Normal Pressurizer Spray

Pressurizer spray valves BBPCV0455B and BBPCV0455C could spuriously open. If this occurs, the spray can be stopped by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer pressure indication is available using BBPI0456 unless a fire alarm is indicated on alarm windows 138, 139 or 148. If this is the case, then monitor BBPI0455A, BBPI0456, BBPI0457 and BBPI0458 to determine an accurate pressure reading. At least three of these indicators should trend the same.

3.2.3 Isolation of Letdown

A fire in area RB could prevent valves BGLCV0459 and BGLCV0460 from being closed using their associated control room hand switches. If this occurs, the valves can be closed by isolating air to the valves. This can be accomplished by depressing the CLOSE push button on KAHIS0029 to close KAFV0029. KAHIS0029 is located on RL024. Pressurizer level indication is available using BBLI0459A or BBLI0460A, depending on the location of the fire.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

3.3.1 RHR Initiation

When transferring to RHR for cold shutdown, it may be necessary to make a containment entry to manually open BBPV8702A or BBPV8702B and EJHV8701A or EJHV8701B, if unresponsive from the control room. It is expected that the fire will be extinguished, and the smoke cleared before this action is necessary.

3.3.2 SI Accumulators

A containment entry may be required to close EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D prior to the RCS reaching 1000 psig. It is expected that the fire will be extinguished, and the smoke cleared before this action is necessary.

3.3.3 Excess Letdown Flowpath

It may be necessary to manually open BBHV8157A or BBHV8157B to establish a flowpath from the excess letdown heat exchanger to the PRT. It may also be necessary to close switch NK4119 to re-open valves BGHV8153A and BGHV8154A or close switch NK4407 to re-open BGHV8153B and BGHV8154B to establish a flowpath from the RCS to the excess letdown heat exchanger. Cable repairs may be necessary prior to closing these switches.

4.0 CONCLUSION

With some exceptions, redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area. For those exceptions, feasible manual actions are available and are unaffected by the fire. Manual actions are documented in Section 3.0.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area RB.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA RB

PFSSD components (S. in E-15000) located in fire area RB are shown in Table RB-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table RB-3.

Table RB-3
PFSSD Equipment Located in Fire Area RB

FIRE AREA	PFSSD Equipment	Description	Evaluation Section	Comments
RB-1	021JJ001	Junction Box Associated With Source Range Detector SE02	5.1.1	
RB-1	021JJ063	Junction Box Associated With Source Range Detector SE04	5.1.1	
RB-1	022JJ001	Junction Box Associated With Source Range Detector SE06	5.1.1	
RB-1	024JJ001	Junction Box Associated With Source Range Detector SE08	5.1.1	
RB-1	BB8949B	SI/RHR Discharge To RCS Loop 2 Check Valve	5.1.2	
RB-1	BB8949C	SI/RHR Discharge To RCS Loop 3 Check Valve	5.1.2	
RB-1	BBPV8702A	RCS Hot Leg 1 To RHR Pump A Suction Isolation Valve	5.1.3	
RB-1	BBPV8702B	RCS Hot Leg 4 To RHR Pump B Suction Isolation Valve	5.1.3	
RB-1	BBTE0413A	RCS Hot Leg Wide Range Temperature Element Loop 1	5.1.4	
RB-1	BBTE0413B	RCS Cold Leg Wide Range Temperature Element Loop 1	5.1.4	
RB-1	BBTE0423A	RCS Hot Leg Wide Range Temperature Element Loop 2	5.1.4	
RB-1	BBTE0423B	RCS Cold Leg Wide Range Temperature Element Loop 2	5.1.4	
RB-1	BBTE0433A	RCS Hot Leg Wide Range Temperature Element Loop 3	5.1.4	
RB-1	BBTE0433B	RCS Cold Leg Wide Range Temperature Element Loop 3	5.1.4	
RB-1	BBTE0443A	RCS Hot Leg Wide Range Temperature Element Loop 4	5.1.4	
RB-1	BBTE0443B	RCS Cold Leg Wide Range Temperature Element Loop 4	5.1.4	
RB-1	BBZS8702AA	Valve BBPV8702A Position Switch	5.1.5	Interlock with valve EJHV8811A
RB-1	BGHV8153A	RCS To Excess Letdown Heat Exchanger Isolation Valve	5.1.6	
RB-1	BGHV8153B	RCS To Excess Letdown Heat Exchanger Isolation Valve	5.1.6	
RB-1	BGHV8154A	RCS To Excess Letdown Heat Exchanger Isolation Valve	5.1.6	
RB-1	BGHV8154B	RCS To Excess Letdown Heat Exchanger Isolation Valve	5.1.6	
RB-1	BGHY0459	Valve BGLCV0459 Solenoid	5.1.7	
RB-1	BGHY0460	Valve BGLCV0460 Solenoid	5.1.7	
RB-1	BGLCV0459	RCS To Letdown Isolation Valve	5.1.7	

Table RB-3
PFSSD Equipment Located in Fire Area RB

FIRE AREA	PFSSD Equipment	Description	Evaluation Section	Comments
RB-1	BGLCV0460	RCS To Letdown Isolation Valve	5.1.7	
RB-1	EBG02	Excess Letdown Heat Exchanger	5.1.8	
RB-1	TB23105	Terminal Box Associated With BBTE0443B	5.1.4	
RB-1	TB23112	Terminal Box Associated With BBTE0443A	5.1.4	
RB-1	TB23113	Terminal Box Associated With BBTE0413B	5.1.4	
RB-1	TB23114	Terminal Box Associated With BBTE0413A	5.1.4	
RB-1	TB23202	Terminal Box associated with BGHV8149A/B/C	5.1.7	
RB-1	TB23205	Terminal Box Associated With BBTE0423A	5.1.4	
RB-1	TB23206	Terminal Box Associated With BBTE0423B	5.1.4	
RB-1	TB23207	Terminal Box Associated With BBTE0433A	5.1.4	
RB-1	TB23208	Terminal Box Associated With BBTE0433B	5.1.4	
RB-2	AELT0501	Steam Generator A Wide Range Level Transmitter	5.1.9	
RB-2	AELT0502	Steam Generator B Wide Range Level Transmitter	5.1.9	
RB-2	AELT0503	Steam Generator C Wide Range Level Transmitter	5.1.9	
RB-2	AELT0504	Steam Generator D Wide Range Level Transmitter	5.1.9	
RB-2	BBFT0018	RCP B Thermal Barrier Outlet Flow	5.1.18	
RB-2	BBHV0014	RCP B Thermal Barrier Cooler Isolation Valve	5.1.18	
RB-2	BBHV8157A	Excess Letdown to PRT Isolation Valve	5.1.6	
RB-2	BBHV8157B	Excess Letdown to PRT Isolation Valve	5.1.6	
RB-2	BGHV8112	Seal Water Return Containment Isolation Valve	5.1.21	
RB-2	EFHV0033	Essential Service Water To Train A Containment Coolers	5.1.11	
RB-2	EFHV0034	Essential Service Water To Train B Containment Coolers	5.1.11	
RB-2	EFHV0045	Essential Service Water To Train A Containment Coolers	5.1.11	
RB-2	EFHV0046	Essential Service Water To Train B Containment Coolers	5.1.11	

Table RB-3 PFSSD Equipment Located in Fire Area RB				
FIRE AREA	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
RB-2	EGHV0060	CCW Return from RCP Containment Iso Valve	5.1.18	
RB-2	EGHV0062	CCW Return from RCP Containment Iso Valve	5.1.18	
RB-2	EGHV0132	CCW Return from RCP Containment Iso Valve	5.1.18	
RB-2	EJHV8701A	RCS To RHR Pump A Isolation Valve	5.1.3	
RB-2	EJHV8701B	RCS To RHR Pump B Isolation Valve	5.1.3	
RB-2	EJZS8701A	Valve EJHV8701A Position Switch	5.1.5	
RB-2	EJZS8701BA	Valve EJHV8701B Position Switch	5.1.5	
RB-2	EMHV8843	Boron Injection Upstream Test Line	5.1.12	
RB-2	EMHV8871	SI Test Line Inside Containment Isolation Valve	5.1.12	
RB-2	EMHV8882	Boron Injection Downstream Test Line	5.1.12	
RB-2	EMHY8843	Valve EMHV8843 Solenoid	5.1.12	
RB-2	EMHY8871	Valve EMHV8871 Solenoid	5.1.12	
RB-2	EMHY8882	Valve EMHV8882 Solenoid	5.1.12	
RB-2	EPHV8808A	SI Accumulator Tank A Isolation Valve	5.1.13	
RB-2	EPHV8808B	SI Accumulator Tank B Isolation Valve	5.1.13	
RB-2	EPHV8808C	SI Accumulator Tank C Isolation Valve	5.1.13	
RB-2	EPHV8808D	SI Accumulator Tank D Isolation Valve	5.1.13	
RB-3	AELT0518	Steam Generator A Narrow Range Level Transmitter	5.1.9	
RB-3	AELT0551	Steam Generator A Narrow Range Level Transmitter	5.1.9	
RB-3	BBFT0017	RCP A Thermal Barrier Outlet Flow	5.1.18	
RB-3	BBHV0013	RCP A Thermal Barrier Cooler Isolation Valve	5.1.18	
RB-4	AELT0547	Steam Generator D Narrow Range Level Transmitter	5.1.9	
RB-4	AELT0554	Steam Generator D Narrow Range Level Transmitter	5.1.9	
RB-4	BBFT0020	RCP D Thermal Barrier Outlet Flow	5.1.18	

Table RB-3
PFSSD Equipment Located in Fire Area RB

FIRE AREA	PFSSD Equipment	Description	Evaluation Section	Comments
RB-4	BBHV0016	RCP D Thermal Barrier Cooler Isolation Valve	5.1.18	
RB-4	BBLT0459	Pressurizer Narrow Range Level Transmitter	5.1.14	
RB-4	BBLT0460	Pressurizer Narrow Range Level Transmitter	5.1.14	
RB-4	BBPT0455	Pressurizer Pressure Transmitter	5.1.15 5.1.20	
RB-4	BBPT0456	Pressurizer Pressure Transmitter	5.1.15 5.1.20	
RB-5	DSGN01A	Containment Cooler Train A Motor	5.1.16	
RB-5	DSGN01C	Containment Cooler Train A Motor	5.1.16	
RB-6	None	N/A	N/A	N/A
RB-7	AELT0517	Steam Generator A Narrow Range Level Transmitter	5.1.9	
RB-7	AELT0519	Steam Generator A Narrow Range Water Transmitter	5.1.9	
RB-7	AELT0548	Steam Generator D Narrow Range Water Transmitter	5.1.9	
RB-7	AELT0549	Steam Generator D Narrow Range Water Transmitter	5.1.9	
RB-8	AELT0527	Steam Generator B Narrow Range Water Transmitter	5.1.9	
RB-8	AELT0528	Steam Generator B Narrow Range Water Transmitter	5.1.9	
RB-8	AELT0529	Steam Generator B Narrow Range Water Transmitter	5.1.9	
RB-8	AELT0537	Steam Generator C Narrow Range Water Transmitter	5.1.9	
RB-8	AELT0538	Steam Generator C Narrow Range Water Transmitter	5.1.9	
RB-8	AELT0539	Steam Generator C Narrow Range Water Transmitter	5.1.9	
RB-8	AELT0552	Steam Generator B Narrow Range Water Transmitter	5.1.9	
RB-8	AELT0553	Steam Generator C Narrow Range Water Transmitter	5.1.9	
RB-8	BBFT0018	RCP C Thermal Barrier Outlet Flow	5.1.18	
RB-8	BBHV0015	RCP C Thermal Barrier Cooler Isolation Valve	5.1.18	

Table RB-3 PFSSD Equipment Located in Fire Area RB				
FIRE AREA	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
RB-8	BGHV8149A	Letdown Orifice A Isolation Valve	5.1.7	
RB-8	BGHV8149B	Letdown Orifice B Isolation Valve	5.1.7	
RB-8	BGHV8149C	Letdown Orifice C Isolation Valve	5.1.7	
RB-8	TB24202	Terminal Box Associated with Letdown Orifice Isolation Valves	5.1.7	
RB-9	None	N/A	N/A	N/A
RB-10	BBHV8000A	Pressurizer PORV Block Valve	5.1.17	
RB-10	BBHV8000B	Pressurizer PORV Block Valve	5.1.17	
RB-10	BBHV8001A	Reactor Vessel Head Vent Valve	5.1.10	
RB-10	BBHV8001B	Reactor Vessel Head Vent Valve	5.1.10	
RB-10	BBHV8002A	Reactor Vessel Head Vent Valve	5.1.10	
RB-10	BBHV8002B	Reactor Vessel Head Vent Valve	5.1.10	
RB-10	BBPCV0455A	Pressurizer PORV	5.1.17	
RB-10	BBPCV0455B	Pressurizer Spray Valve	5.1.19	
RB-10	BBPCV0455C	Pressurizer Spray Valve	5.1.19	
RB-10	BBPCV0456A	Pressurizer PORV	5.1.17	
RB-10	BBPT0457	Pressurizer Pressure Transmitter	5.1.15 5.1.20	
RB-10	BBPT0458	Pressurizer Pressure Transmitter	5.1.15 5.1.20	
RB-10	BBPY0455BA	Pressurizer Spray Valve BBPCV0455B I/P Converter	5.1.19	
RB-10	BBPY0455CA	Pressurizer Spray Valve BBPCV0455C I/P Converter	5.1.19	
RB-10	DSGN01B	Containment Cooler Train B Motor	5.1.16	
RB-10	DSGN01D	Containment Cooler Train B Motor	5.1.16	
RB-11	SE-02	Source Range Detector	5.1.1	

Table RB-3 PFSSD Equipment Located in Fire Area RB				
FIRE AREA	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
RB-11	SE-04	Source Range Detector	5.1.1	
RB-11	SE-06	Source Range Detector	5.1.1	
RB-11	SE-08	Source Range Detector	5.1.1	

5.1.1 Source Range Monitoring

The reactivity control function of PFSSD requires source range flux monitoring to be available. The PFSSD logic uses four source range detectors and associated cables and components to establish source range monitoring. The four source range detectors are listed in Table RB-4.

Table RB-4
Source Range Detectors used for PFSSD

DETECTOR	DESCRIPTION
SE02	Source range channel N31 (SENE0031) Sep. Group 1
SE04	Post-Accident Source Range (SENY0060A/B) Sep. Group 1
SE06	Source range channel N32 (SENE0032) Sep. Group 2
SE08	Post-Accident Source Range (SENY0061A/B) Sep. Group 4

The two source range detectors (SE02 and SE06) are positioned at 0 and 180 degree locations and the post-accident detectors (SE04 and SE08) are positioned at 90 and 270 degree locations.

A fire in area RB-11 is not expected to involve all four source range detectors. The combustible loading is very low and consists mainly of polyethylene canisters surrounding the detectors and IEEE 383 rated cables running to the detectors. There are no transient combustibles in the area during power operation. A fire would most likely involve a single detector, but not all four.

Cables associated with the four source range detectors are run in conduit throughout the reactor building. The cables are adequately separated such that any single credible fire will not affect all four source range detectors. The worse-case credible fire scenario occurs on the North end of area RB-1 at the 2000'-0" elevation. A fire in this area could damage cables for source range detectors SE02, SE04 and SE08 but source range detector SE06 would not be affected due to horizontal separation greater than 20 feet with limited quantities of intervening combustibles. A fire in any other area of the reactor building will not affect more than two source range detectors.

Based on the above discussion, there is reasonable assurance that a fire in the reactor building will not affect source range monitoring capability on at least one source range monitor.

References: E-15000, XX-E-013, E-1F9101, E-13SE01, E-13SE02, E-13SE07, E-1R2312A, E-1R2312B, E-1R2312C, E-1R2312D, E-1R2322A, E-1R2322C, E-1R2901

5.1.2 SI/RHR Discharge To RCS Loops 2 and 3 Check Valves

Check valves BB8949B and BB8949C are listed in the PFSSD component list in Calculation XX-E-013, Appendix 3 and are listed as S. components in E-15000. These check valves isolate high/low pressure interface boundaries by preventing backflow from the RCS to the RHR/SI systems.

The check valves are mechanical devices and have no electrical interface that, if damaged, could fail the valves in the wrong position. Although the check valves, or redundant counterparts, are not separated per the requirements of 10CFR50, Appendix R, a postulated fire in area RB-1 is not expected to prevent the operation of these check valves. The valves are normally closed due to high RCS pressure pushing the clapper against the valve seat. Given the low fire loading coupled with the large area volume, there is reasonable assurance that a fire in the area will not prevent the valves from performing their PFSSD function.

References: E-15000, XX-E-013, M-12BB01, M-13EM03

5.1.3 RCS Hot Leg To RHR Pump Suction Isolation Valves

The RCS to RHR pump flow path is required to be isolated during hot standby and at least one flow path be available for cold shutdown. RHR pump suction from the RCS is controlled by valves BBPV8702A and EJHV8701A (Train A) and BBPV8702B and EJHV8701B (Train B). For hot standby, either BBPV8702A or EJHV8701A and either BBPV8702B or EJHV8701B needs to be closed. During cold shutdown, the operating train RHR pump needs to draw suction from the RCS.

Valves BBPV8702A and BBPV8702B are located in fire area RB-1. Valve BBPV8702A is located between steam generator (SG) A and reactor coolant pump (RCP) A. Valve BBPV8702B is located between SG B and RCP B. These valves are separated by at least 20 feet of horizontal separation with limited quantities of intervening combustibles. A fire in the vicinity of Loop 1 could damage BBPV8702A but, due to horizontal separation, limited combustible loading, and large spatial volume, there is reasonable assurance that the fire will not affect valve BBPV8702B. Alternatively, a fire in the vicinity of Loop 4 could damage BBPV8702B but, due to horizontal separation, limited combustible loading, and large spatial volume, there is reasonable assurance that the fire will not affect valve BBPV8702A.

Cables for BBPV8702A are run in conduit to the North secondary shield wall then run West through the barrier opening into fire area RB-2. The cables enter a cable tray and run South to the South-West portion of the Reactor Building. The cables are then run in tray up to the South electrical penetration area (Fire Area RB-4) where they enter the Auxiliary Building through penetration ZSI233.

Cables for BBPV8702B are run in conduit to the South secondary shield wall then penetrate the shield wall into fire area RB-2. The cables enter a cable tray in the South portion of area RB-2 and run to the South-West portion of area RB-2 in a common tray as cables for valve BBPV8702A. The cables are then run in tray up to the South electrical penetration area (Fire Area RB-4) where they enter the Auxiliary Building through penetration ZSI233.

A fire in area RB-4 or in the South-West portion of area RB-2 could damage power and control cables for both valves BBPV8702A and BBPV8702B. The damage will not cause either valve to spuriously open unless a 3-phase inter-cable hot short occurs. Based on a review of E-15000 (Setroute), there are no normally energized 3-phase source conductors in the same raceway as the power cables for these valves, except in the cable penetration area (fire area RB-4). In fire area RB-4, 480 volt 3-phase power cables for valves BBPV8702A and BBPV8702B, and hydrogen mixing fan motors DCGN03B and DCGN03D are common in tray 124U2A32. All four cables then pass through penetration ZSI233 and enter the Auxiliary Building. Fire area RB-4 is provided with automatic fire detection and a fixed, manually charged fire suppression system. This arrangement satisfies Wolf Creek's commitments to 10 CFR 50, Appendix R for protection of redundant PFSSD circuits inside non-inerted containments and as approved by the NRC in SER Section 9.5.1.4. Therefore, a fire in this location is not postulated to cause a 3-phase hot short that spuriously opens valves BBPV8702A and BBPV8702B. In the unlikely event that valves BBPV8702A and/or BBPV8702B spuriously open, valves EJHV8701A and EJHV8701B will remain closed, as discussed below.

Valves EJHV8701A and EJHV8701B are located in fire area RB-2. Valve EJHV8701A is located in the North-West portion of area RB-2. Valve EJHV8701B is located in the South-West portion of area RB-2. The valves are separated by at least 20 feet of horizontal separation with limited quantities of intervening combustibles.

Cables for valve EJHV8701A are run primarily in tray to the North portion of area RB-2 then run up to the North electrical penetration area (Fire Area RB-3) and into the Auxiliary Building through penetration ZNI277.

Cables for valve EJHV8701B are run primarily in tray to the North portion of area RB-2 and share a common enclosure with cables for valve EJHV8701A. The cables run up to the North electrical penetration area (Fire Area RB-3) and into the Auxiliary Building through penetration ZNI277.

A fire in area RB-3 or in the North portion of area RB-2 could damage power and control cables associated with both valves EJHV8701A and EJHV8701B. The damage will not cause either valve to spuriously open unless a 3-phase inter-cable hot short occurs. However, power cables for valves EJHV8701A and EJHV8701B are not run in common raceway with any normally energized 3-phase power cables within the Reactor Building. Therefore, neither valve EJHV8701A nor EJHV8701B will spuriously open if a fire occurs in the Reactor Building.

When transferring to RHR for cold shutdown, it may be necessary to make a containment entry to manually open the required train valves if unresponsive from the control room. Since this action is required for cold shutdown, it is anticipated that the fire will be extinguished, and the smoke cleared.

Based on the above discussion, a fire in the Reactor Building will not impact the ability to maintain the RCS to RHR flow path closed during hot standby. A containment entry may be necessary for cold shutdown to open the appropriate flow path valves when transferring to RHR. This would require operators to traverse the fire affected area but can be accomplished well after the fire has been extinguished.

References: E-15000, XX-E-013, E-13BB12A, E-13BB12B, E-13EJ05A, E-13EJ05B, M-12BB01, M-12EJ01, E-1F9205, E-1F9301, E-1R2312A, E-1R2312B, E-1R2312C, E-1R2908A

5.1.4 RCS Hot and Cold Leg Temperature Elements

PFSSD requires RCS hot and cold leg temperature indication on at least one loop to verify natural circulation flow. The temperature elements used for this purpose are listed in Table RB-5.

Table RB-5
RCS Hot and Cold Leg Temperature Elements Used for PFSSD

COMPONENT	FUNCTION
BBTE0413A	RCS Hot Leg Temperature Element (WR) Loop 1
BBTE0413B	RCS Cold Leg Temperature Element (WR) Loop 1
BBTE0423A	RCS Hot Leg Temperature Element (WR) Loop 2
BBTE0423B	RCS Cold Leg Temperature Element (WR) Loop 2
BBTE0433A	RCS Hot Leg Temperature Element (WR) Loop 3
BBTE0433B	RCS Cold Leg Temperature Element (WR) Loop 3
BBTE0443A	RCS Hot Leg Temperature Element (WR) Loop 4
BBTE0443B	RCS Cold Leg Temperature Element (WR) Loop 4

Loops 1 and 4 temperature elements are located in the West portion of area RB-1. Loops 2 and 3 temperature elements are located in the East portion of area RB-1. Except for the lubricating oil contained in each reactor coolant pump (RCP), the area contains limited

quantities of combustible materials. The RCP lubricating oil is not considered a significant fire hazard potential due to the oil collection system installed to meet Wolf Creeks commitments to 10CFR50, Appendix R Section III.O.

Cables associated with separation group 1 temperature elements (BBTE0413A, BBTE0423A, BBTE0433B and BBTE0443B) are run from their respective terminal box to the North electrical penetration room (Fire Area RB-3), where they enter the Auxiliary Building through penetration ZNI287. All four cables share a common enclosure in area RB-3. The cable for BBTE0413A does not share a common enclosure with the other three except in area RB-3. Cables for BBTE0423A, BBTE0433B and BBTE0443B share a common tray enclosure in the Northeast and North portions of area RB-2. Cables for BBTE0433B and BBTE0443B share a common enclosure in the East and Southeast portions of area RB-2 as well as the South portion of area RB-1.

Cables associated with separation group 2 temperature elements (BBTE0413B, BBTE0423B, BBTE0433A and BBTE0443A) are run from their respective terminal box to a common unscheduled junction box located at elevation 2029' - 6" at the NW corner of the primary shield wall in area RB-1. From this junction box, the four cables are run together in conduit up to the 2047' - 6" elevation (Fire Area RB-10) then run West through the SG D shield wall and finally South to the area above the South electrical penetration area. The conduit then turns down and runs into the South electrical penetration area (Fire Area RB-4) where all four cables enter the Auxiliary Building through penetration ZSI243.

Due to the limited quantities of combustibles and the large open spaces in the reactor building, there are no credible fire scenarios that would cause a loss of all eight temperature elements. The worse-case scenario occurs if a fire starts on the West side of area RB-1 on the 2000 elevation, where cables for six temperature elements are run. These temperature elements include all four separation group 2 elements (BBTE0413B, BBTE0423B, BBTE0433A and BBTE0443A) and two separation group 1 elements (BBTE0413A and BBTE0443B). Cables for the remaining two temperature elements (BBTE0423A and BBTE0433B) would not be affected by this postulated fire.

In the worse-case scenario described above, only the RCS Hot Leg Temperature Element (WR) Loop 2 and the RCS Cold Leg Temperature Element (WR) Loop 3 would survive the fire. In addition, procedure EMG ES-04, Attachment B describes alternate indication that can be used to determine natural circulation flow. One of these methods verifies that steam generator pressure is decreasing. All steam generator pressure instruments are located outside containment and will be available if a fire occurs in the reactor building.

Although at least two RCS temperature elements would survive a postulated fire in containment, it would be difficult for operators to know which temperature elements they can rely on because there is no way to know the exact location of a fire without a containment entry. Therefore, the RCS temperature elements are not a reliable source of diagnostic information for a containment fire. As stated in the previous paragraph, steam generator pressure can be used to verify natural circulation.

Based on the above discussion, at least one hot leg temperature element and one cold leg temperature element would be available in the event of a fire in containment. However, the reliable temperature elements would be difficult to determine since the exact fire location would not be known. In the event of a fire in the reactor building, natural circulation flow can be verified using any steam generator pressure indicator.

References: E-15000, XX-E-013, E-1F9201, E-13BB15, E-1R2312A, E-1R2312C, E-1R2322A, E-1R2322C, E-1R2412A, E-1R2412B, E-1R2412C, E-1R2422C, E-1R2512A, E-1R2512B, E-1R2512C, E-1R2512D, E-1R2522C, E-1R2908C, M-12BB01

5.1.5 Containment Sump Isolation Valves

Containment sump isolation valves EJHV8811A and EJHV8811B are required to be closed during hot standby and cold shutdown to prevent draindown of the RWST and RCS into the containment sump. Circuits associated with valve interlocks are run through the reactor building. If these circuits are damaged, it could provide a false permissive to allow valves EJHV8811A and EJHV8811B to open.

Position switch BBZS8702AA is associated with the interlock circuit for valve EJHV8811A. If cable 11EJG06AE is damaged during a fire, a short circuit could occur which would provide the open permissive for valve EJHV8811A. However, hand indicating switch EJHIS8811A, located in the control room, is unaffected by a fire in the reactor building and is available to ensure valve EJHV8811A remains closed. An open in this circuit has no impact on PFSSD.

Valve BBPV8702B position switch provides a permissive to allow EJHV8811B to open only when valve EJHV8701B is fully closed. If cable 14EJG06BE is damaged during a fire, a short circuit could occur which would provide the open permissive for valve EJHV8811B. However, hand indicating switch EJHIS8811B, located in the control room, is unaffected by a fire in the reactor building and is available to ensure valve EJHV8811B remains closed. An open in this circuit has no impact on PFSSD.

Position switch EJZS8701A provides a permissive to allow EJHV8811A to open only when valve EJHV8701A is fully closed. If cable 11EJG06AH is damaged during a fire, a short circuit could occur which would provide the open permissive for valve EJHV8811A. However, hand indicating switch EJHIS8811A, located in the control room, is unaffected by a fire in the reactor building and is available to ensure valve EJHV8811A remains closed. An open in this circuit has no impact on PFSSD.

Position switch EJZS8701BA provides a permissive to allow EJHV8811B to open only when valve EJHV8701B is fully closed. If cable 14EJG06BH is damaged during a fire, a short circuit could occur which would provide the open permissive for valve EJHV8811B. However, hand indicating switch EJHIS8811B, located in the control room, is unaffected by a fire in the reactor building and is available to ensure valve EJHV8811B remains closed. An open in this circuit has no impact on PFSSD.

Based on this discussion, a fire in the reactor building will not cause containment sump isolation valves EJHV8811A and EJHV8811B to spuriously open.

References: E-15000, XX-E-013, E-1F9205, E-13EJ06A, E-13EJ06B

5.1.6 Excess Letdown

For hot standby, PFSSD requires the excess letdown path be isolated to prevent uncontrolled depressurization of the RCS. To accomplish this, either normally closed valve BGHV8153A or BGHV8154A must be maintained closed and either normally closed valve BGHV8153B or BGHV8154B must be maintained closed. Circuits for all four valves are run through fire area RB.

All four valves are located within 10 feet of each other in area RB-1 near Reactor Coolant Pump D. The cable for valve BGHV8154A (11BGK48DA) runs from this area along the North side of area RB-2 and ends at the North electrical penetration area (RB-3) where it enters the Auxiliary Building through penetration ZNE277. The cable for valve BGHV8153A (11BGK48CA) runs from this area along the South side of area RB-2 and ends at the North electrical penetration area (RB-3) where it enters the Auxiliary Building through penetration ZNE278.

The cable for valve BGHV8154B (14BGK48BA) runs East from the valve through the SG C area and into the SE portion of area RB-2. The cable then runs West in a cable tray and into the South electrical penetration area (area RB-4) where it enters the Auxiliary Building through penetration ZSE233. The cable for valve BGHV8153B (14BGK48AA) runs South from the valve through the South secondary shield wall and drops into a tray where it runs up to the South electrical penetration area (area RB-4) and enters the Auxiliary Building through penetration ZSE234.

A fire in the SW portion of fire area RB-1, where all four valves are located, will not cause the valves to spuriously open, but could prevent operation of the valves from the control room. The valves will not spuriously open because the control cables are run in conduit with no other cables that have the proper voltage to energize and open the valves. In addition, an intra cable hot short in these cables will not spuriously open the valves. A ground fault equivalent hot short (GFEHS) from an external 125 VDC source through the ground plane in contact with conductor 2 in cable 'A' associated with these valves could open the valves. Fire testing (NUREG/CR-7100) has shown that GFEHS is plausible. Fire testing (NUREG/CR-7100) has also shown that intra-cable shorting occurs prior to inter-cable shorting. Intra-cable shorting between conductors 2 and N1 combined with GFEHS will blow the control power fuse and close the valves. Furthermore, two valves would have to spuriously open in this manner to establish an excess letdown flowpath. Based on this discussion, there is reasonable assurance that spurious opening of an excess letdown flowpath will not occur.

If a fire starts in the North end of area RB-2; the North electrical penetration area (area RB-3); or the South electrical penetration area (area RB-4), the fire could cause an inter-cable hot short, energize the control solenoid and open the valve. This would allow water flow through the separation group 1 or 4 flow path, depending on the location of the fire. If a fire starts anywhere else, at least one of the redundant excess letdown flow path valves on each line will remain closed.

A spurious opening of the excess letdown isolation valves can be mitigated by opening breaker NK4119 to fail close valves BGHV8153A and BGHV8154A and opening breaker NK4407 to fail close valves BGHV8153B and BGHV8154B. Breaker NK4119 is located in fire area C-16 and breaker NK4407 is located in fire area C-15. These actions are not critical because calculation WCNOC-CP-002 shows that with excess letdown valves open, there will be sufficient makeup to the RCS to ensure the core remains covered. Therefore, no E-1F9900 OMA is required for excess letdown isolation to achieve and maintain hot standby. Reference Attachment 4, MSO Evaluation Scenario ID PWROG 8.

For cold shutdown, it may be necessary to establish a letdown flowpath to prevent overfilling the pressurizer. Valves BBHV8157A and BBHV8157B are included in the PFSSD equipment list to ensure excess letdown can be placed in service. The cables for these valves are not included in the PFSSD design because the valves can be manually operated when transitioning to cold shutdown. The power supplies are included in the PFSSD design and are located outside of this fire area. If necessary, operators can disconnect power to the valves and manually open them. In addition, operators may need to repair one flow path from the RCS to the excess letdown heat exchanger to open these valves.

Based on the above discussion, excess letdown can be isolated for hot standby and repairs can be completed if excess letdown is needed for cold shutdown.

References: E-15000, XX-E-013, E-1F9301, E-13BB35, E-13BG48, E-1R2312A, E-1R2312B, E-1R2312C, E-1R2312D, E-1R2321, E-1R2322A, E-1R2412A, E-1R2422A, E-1R2908B

5.1.7 Letdown Isolation Valves and Letdown Orifice Isolation Valves

Letdown isolation valves BGLCV0459 and BGLCV0460 are isolation valves installed in series on the inlet side of the regenerative heat exchanger. PFSSD requires that one of these valves be closed or letdown orifice valves BGHV8149A, BGHV8149B, and BGHV8149C be closed to prevent loss of inventory through the letdown flow path.

Cables associated with BGLCV0459 and BGLCV0460 are routed in this fire area. Damage to the cables could prevent closing the valves from the control room using the respective hand switch.

Letdown orifice isolation valves BGHV8149A, BGHV8149B, and BGHV8149C are listed as PFSSD components because of the interlock between these valves and BGLCV0459 and BGLCV0460. The interlock prevents closure of the letdown valves when any one or more orifice isolation valves are open. Cables associated with all three letdown orifice isolation valves are located in this fire area. Damage to these cables could prevent closure of the valves from the control room using their respective hand switch. Therefore, a fire in area RB could prevent closure of all three letdown orifice isolation valves (BGHV8149A, BGHV8149B, and BGHV8149C) as well as the two letdown isolation valves (BGLCV0459 and BGLCV0460) using their respective hand switches in the control room.

Valves BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B, and BGHV8149C are air operated and fail in the closed position. The valves are located in containment. Instrument air to containment is controlled by valve KAFV0029, which is unaffected by a fire in area RB. Therefore, hand switch KAHIS0029 can be used to close the valve from the control room and isolate instrument air to containment. Pressurizer level indication is available using BBLI0459A and BBLI0460A.

Based on the above discussion, letdown valves BGLCV0459 and BGLCV0460 and letdown orifice valves BGHV8149A, BGHV8149B, and BGHV8149C can be closed from the control room if a fire occurs in area RB.

References: E-15000, XX-E-013, E-13BG10, E-13BG35, E-13KA02, M-12BG01, E-1F9301, M-12KA01

5.1.8 Excess Letdown Heat Exchanger

The excess letdown heat exchanger serves no PFSSD function except that flow to the heat exchanger needs to be isolated to prevent loss of inventory through the excess letdown flow path. As discussed previously, flow to the excess letdown heat exchanger is isolated by closing valves BGHV8153A or BGHV8154A and BGHV8153B or BGHV8154B.

References: E-15000, XX-E-013, M-12BG01

5.1.9 Steam Generator Level Transmitters

Steam generator level control on at least two steam generators is required for PFSSD. All three auxiliary feedwater pumps are available to supply feedwater to the steam generators. Cables for all 20 steam generator level transmitters are run throughout the reactor building. However, due to the limited quantities of combustible materials and horizontal separation between circuits, a single credible fire in the reactor building will not damage circuits for all 20 level transmitters.

As stated in Section 1.0, there are 11 line-type detection zones located in containment. Since detection is provided wherever significant fire hazards exist, there is reasonable assurance that a fire in containment would alarm one or more of these detection zones. A review was performed to determine the cable routing for each steam generator level transmitter and

compare the routing against the detection drawings to determine the available level transmitters if a fire is annunciated on each zone.

Control room alarm panel KC008 monitors the fire alarm system throughout the plant. In the event one or more of the containment detection zones alarms, KC008 will display a unique address for that zone. The operators can then determine the correct response to that alarm by entering procedure ALR KC-888, Fire Protection Panel KC008 Alarm Response. The alarm points are arranged by window number rather than zone number. The window number is incorporated in the address label.

Table RB-6 identifies each KC008 alarm window associated with the heat detection in containment as well as the unique address label displayed on KC008. The table also identifies the steam generator level transmitters that are unaffected by a fire in these zones.

Table RB-6

KC008 Alarm Window	Address Label	Available Steam Generator Level Transmitters			
		SG A	SG B	SG C	SG D
137 (Z201)	RB-SEP GRP 1 TRAY EL 2000 ALRM/137	AELT0551	None	None	AELT0547 AELT0548 AELT0549 AELT0554
138 (Z202)	RB-SEP GRP 4 TRAY EL 2000 ALRM/138	AELT0551	None	None	AELT0547 AELT0548 AELT0549 AELT0554
139 (Z203)	RB-SEP GRP 5-6 TRAY EL 2026 ALRM/139	AELT0501	AELT0527 AELT0529	AELT0537 AELT0539	None
140 (Z204)	RB-SEP GRP 4 TRAY EL 2026 ALRM/140	AELT0501 AELT0518 AELT0519 AELT0551	AELT0502 AELT0528 AELT0529 AELT0552	AELT0503 AELT0538	AELT0548 AELT0549
141 (Z205)	RB-SEP GRP 5-6 TRAY OUT EL 2026 ALRM/141	AELT0501 AELT0518 AELT0519 AELT0551	AELT0502	AELT0503	AELT0548 AELT0549 AELT0554
142 (Z206)	RB SEP GRP 5-6 TRAY IN EL 2026 TRBL/142	AELT0501 AELT0517 AELT0518 AELT0519 AELT0551	AELT0502 AELT0527 AELT0528 AELT0529 AELT0552	AELT0503 AELT0537 AELT0538 AELT0539 AELT0553	AELT0504 AELT0547 AELT0548 AELT0549 AELT0554
147 (Z215)	RB-SEP GRP 5 NORTH CA PENE ALRM/147	AELT0517	AELT0502 AELT0527 AELT0552	AELT0537 AELT0553	AELT0504 AELT0547 AELT0549
148 (Z216)	RB-SEP GRP 6 SOUTH CA PENE ALRM/148	AELT0501 AELT0518 AELT0551	AELT0528 AELT0529	AELT0503 AELT0538 AELT0539	AELT0548
149 (Z217)	RB-SEP GRP 1 EL 2026/2047 ALRM/149	AELT0517 AELT0518 AELT0519	AELT0502 AELT0527 AELT0528 AELT0552	AELT0503 AELT0537 AELT0538 AELT0553	AELT0504 AELT0547 AELT0548 AELT0549
150 (Z218)	RB-RV HEAD WEST ALRM/150	AELT0501 AELT0517 AELT0518 AELT0519 AELT0551	AELT0502 AELT0527 AELT0528 AELT0529 AELT0552	AELT0503 AELT0537 AELT0538 AELT0539 AELT0553	AELT0504 AELT0547 AELT0548 AELT0549 AELT0554
151 (Z220)	RB-RV HEAD EAST ALRM/151	AELT0501 AELT0517 AELT0518 AELT0519 AELT0551	AELT0502 AELT0527 AELT0528 AELT0529 AELT0552	AELT0503 AELT0537 AELT0538 AELT0539 AELT0553	AELT0504 AELT0547 AELT0548 AELT0549 AELT0554

Based on the above discussion, there is reasonable assurance that level indication will be available on at least two steam generators if a fire occurs in containment.

References: E-15000, XX-E-013, E-1F9203, E-13AE08, E-13AE12, E-1F2311, E-0F2321, E-1F2411, E-0F2421, E-1F2511, E-1F2521, E-1R2311, E-1R2312A, E-1R2312B, E-1R2312C, E-1R2312D, E-1R2312E, E-1R2321, E-1R2322A, E-1R2322B, E-1R2322C, E-1R2322D, E-1R2412A, E-1R2412B, E-1R2412C, E-1R2412D, E-1R2413, E-1R2422A, E-1R2422B, E-1R2422C, E-1R2422D, E-1R2512A, E-1R2512B, E-1R2512C, E-1R2512D, E-1R2901, E-1R2904E-1R2905, E-1R2907

5.1.10 Reactor Vessel Head Vent Valves

PFSSD requires that one of the two reactor vessel head vent valves on each flow path (2 flow paths total) be closed to prevent uncontrolled depressurization of the RCS. Either valve BBHV8001A or BBHV8002A and either BBHV8001B or BBHV8002B needs to be closed to satisfy PFSSD.

All four head vent valves are located in close proximity to each other on the 2047’-6” elevation of the reactor building near the reactor head. All four valves are normally closed and require operation of a hand switch in the control room to energize the control solenoid and open the valve.

In order for any of the valves to spuriously open, an inter-cable +125V DC hot short or a ground fault equivalent hot short (GFEHS) has to occur across conductor 2 in the associated control cable. This hot short has to occur prior to an intra-cable short occurring between conductors 2 and N2 in the associated cable because an intra-cable short between these conductors coincident with a GFEHS will open the circuit protective device and de-energize the control solenoid. Fire testing (NUREG/CR-7100) has shown that intra-cable shorting in thermoset cables occurs before inter-cable or GFEHS shorting. Therefore, there is reasonable assurance that inter-cable or GFEHS shorts will not cause two valves to open if a fire occurs in this area.

Cable 11BBK30AB is run in conduit from valve BBHV8001A to the North electrical penetration room (fire area RB-3) and enters the Auxiliary Building through penetration ZNI277. The conduit contains one other cable which is a computer cable associated with the valve. The cable does not carry the proper voltage to spuriously open the valve. Therefore, valve BBHV8001A will remain closed if a fire occurs in the reactor building.

Cable 14BBK30BB is run in conduit from valve BBHV8001B to the North wall of the reactor building. The conduit turns down to the 2000’-0” elevation where it runs West along the reactor building North wall. The cable then drops into a cable tray and runs along the West side of the building to the area below the South electrical penetration room. The tray then turns up into the South electrical penetration room where the cable enters the Auxiliary building through penetration ZSI234.

The conduit portion of the 14BBK30BB cable run contains one other cable, a computer cable, associated with valve BBHV8001B. The computer cable does not carry the proper voltage to spuriously open valve BBHV8001B. Therefore, fire damage to the cable in the area of the conduit run will not cause valve BBHV8001B to spuriously open. Where cable 14BBK30BB is run in tray, other cables in the tray may have the proper voltage and polarity to spuriously open valve BBHV8001B in the case of a hot short. If this should occur, valve BBHV8002B is unaffected by the fire, as discussed below.

Cable 14BBK30DB is run in conduit from valve BBHV8002B to the North wall of the reactor building. The cable then turns East in conduit approximately 15 feet where it drops to the

2000'-0" elevation. On the 2000'-0" elevation, the cable drops from a conduit into a cable tray where it runs along the East side of the building and rises up to the 2026'-0" elevation on the SE side of the building. The cable continues in tray to the South electrical penetration room where it enters the Auxiliary Building through penetration ZSI233.

The conduit portion of the 14BBK30DB cable run contains one other cable, a computer cable, associated with valve BBHV8002B. The computer cable does not carry the proper voltage to spuriously open valve BBHV8002B. Therefore, fire damage to the cable in the area of the conduit run will not cause valve BBHV8002B to spuriously open. Where cable 14BBK30DB is run in tray, other cables in the tray may have the proper voltage and polarity to spuriously open valve BBHV8002B in the case of a hot short. In this case, valve BBHV8001B is unaffected by the fire, as discussed above.

A fire in the reactor building will not affect the ability to maintain the reactor vessel head vent valve flow paths closed. Valve BBHV8001A will remain closed if the fire occurs anywhere in the building. Valve BBHV8001B will remain closed if the fire occurs anywhere except the West side of the 2000'-0" elevation, where it may spuriously open due to a cable-to-cable +125V DC hot short. Valve BBHV8002B will remain closed if the fire occurs anywhere except the East side of the 2000'-0" elevation, where it may spuriously open due to a cable-to-cable +125V DC hot short.

References: E-15000, XX-E-013, E-1R2312A, E-1R2312B, E-1R2312C, E-1R2312D, E-1R2322A, E-1R2322B, E-1R2322C, E-1R2322D, E-1R2412A, E-1R2412C, E-1R2512C, E-1R2522C

5.1.11 Essential Service Water Flow to Containment Coolers

PFSSD requires containment cooling to maintain the containment environment within EQ limits. Essential service water flow to Train A containment coolers is controlled by valves EFHV0031, EFHV0033, EFHV0045 and EFHV0049. Essential service water flow to Train B containment coolers is controlled by valves EFHV0032, EFHV0034, EFHV0046 and EFHV0050. All four valves on the associated train are required to be open to ensure a flow of service water to the containment coolers.

Valves EFHV0031, EFHV0032, EFHV0049 and EFHV0050 and associated circuits are located outside the reactor building and are unaffected by a fire in the reactor building.
Train A valves EFHV0033 and EFHV0045 are located in the NW portion of area RB-2. Circuits associated with these valves are run to the North electrical penetration room (fire area RB-3). A fire in these areas could prevent operation of valves EFHV0033 and EFHV0045 from the control room and could cause the spurious closure of the valves, causing Train A containment cooling to be lost.

Train B valves EFHV0034 and EFHV0046 are located in the SW portion of area RB-2. Circuits associated with these valves are run to the South electrical penetration room (fire area RB-4). A fire in these areas could prevent operation of valves EFHV0034 and EFHV0046 from the control room and could cause the spurious closure of the valves, causing Train B containment cooling to be lost.

Valves and circuits associated with Train A and Train B are separated from each other by more than 20 feet of horizontal distance and limited quantities of combustible materials are located between redundant components. The horizontal distance, lack of sufficient quantities of combustible material and the large volume of the reactor building provides reasonable assurance that a single credible fire will not affect both trains of valves. Therefore, containment cooling is assured if a fire occurs in the reactor building using either Train A or Train B containment coolers.

References: E-15000, XX-E-013, E-1F9441, E-13EF09, E-1R2908A, E-1R2908B, M-12EF02

5.1.12 Boron Injection Tank Flow Diversion

A fire in the reactor building may require charging through the boron injection tank flow path due to possible momentary loss of coolant through the letdown flow path until either BGLCV0459 or BGLCV0460 are closed. This requires ensuring the SIS test lines are isolated to ensure charging flow is directed to the RCS.

Isolation of the SIS test lines is accomplished by either closing valves EMHV8843 and EMHV8882 or closing either EMHV8964 or EMHV8871. Cables associated with EMHV8843, EMHV8882 and EMHV8871 are run in the reactor building. Cables associated with valve EMHV8964 are not run in the reactor building.

A fire in certain areas of the reactor building could cause damage to cables associated with valves EMHV8843, EMHV8882 and EMHV8871 such that the valves spuriously open. However, valve EMHV8964 is unaffected by a fire in the reactor building and is available to ensure loss of charging flow through the SIS test line does not occur.

Isolation of the SIS test line is unaffected by a fire in the reactor building.

References: E-15000, XX-E-013, E-1F9302, E-13EM04, E-13EM04A, E-13EM05A, E-13EM12, M-12EM02

5.1.13 Safety Injection Accumulator Isolation Valves

PFSSD requires isolation of the SI accumulators prior to reducing RCS pressure below the injection pressure to avoid unnecessary accumulator discharge. This is accomplished by closing valves EPHV8808A, EPHV8808B, EPHV8808C and EPHV8808D. These valves are normally open with the MCC breaker locked in the open position. Cables for all four valves are run in the reactor building.

Since the breakers for these valves are normally open, damage to the associated cables will not cause the valves to spuriously change position. However, damage to the cables will prevent closing the associated valve from the control room after power is restored.
The SI accumulators need to be isolated during cold shutdown, prior to the RCS reaching 1000 psig. If necessary, a containment entry can be made to manually close the valves.

A fire in the reactor building may require a containment entry to close one or more accumulator valves if these valves are unresponsive from the control room. This may require the operator to traverse the fire affected area, but this action is not required until well after the fire is extinguished.

References: E-15000, XX-E-013, E-13EP02A, M-12EP01

5.1.14 Pressurizer Level Indication

Pressurizer level indication is required to be available to satisfy PFSSD. Pressurizer level transmitters BBLT0459 and BBLT0460 are used to establish pressurizer level. At least one of these transmitters is required to be available.

Both BBLT0459 and BBLT0460, and associated cables, are installed in fire area RB-4 within 20 feet of each other. This arrangement is acceptable due to the installation of an automatic fire detection system and a fixed, manually charged fire suppression system in area RB-4, as described earlier.

Conduit 121J2027 contains an instrument cable (11BBI16PA) for BBLT0459. This conduit is partially wrapped with Darmatt 1-hour fire barrier system to meet the requirements for a non-combustible radiant energy shield in the area where fire suppression and detection is not installed. The conduit is wrapped from the 2043'-6" elevation prior to exiting fire area RB-4 to the unscheduled junction box between conduits 121J2027 and 121J2051. This arrangement ensures at least 20 feet of horizontal separation exists between unprotected raceways carrying cables for BBLT0459 and BBLT0460 and meets the requirements of 10CFR50, Appendix R, Section III.G.2.d and III.G.2.f.

If a fire occurs in containment it would be difficult to accurately determine the location and therefore difficult to know which level transmitter to rely on. Pressurizer level transmitters BBLT0461 and BBLT0462 are also located in fire area RB-4. These transmitters are not included in the PFSSD component list because either BBLT0459 or BBLT0460 are available in the remaining fire areas. Therefore, it was not necessary to add BBLT0461 and BBLT0462, and associated level indicators, to the PFSSD equipment list. These level transmitters are being credited only for area RB to provide operators with additional level instruments to use.

As discussed in Section 1.0, the fire protection features in area RB-4 provide reasonable assurance that only one level transmitter will be damaged if the fire is in area RB-4. Level transmitter BBLT0460 and associated cable 12BBI16QA is located completely within area RB-4. If the fire is outside area RB-4, then there is reasonable assurance that pressurizer level indicator BBLI0460A will be available. Protectowire heat detection zones 203, 204 and 216 run in area RB-4. If a fire is detected in any of these zones as indicated by KC008 fire alarm windows 138, 139 or 148, then Operators should monitor all four level indicators to determine which is the faulted indicator and rely on the remaining three.

Based on the above discussion, pressurizer level indication is assured for a fire in the reactor building.

References: E-15000, XX-E-013, DCP 07037, E-1F9301, E-13BB16, E-1R2412A, E-1R2412B, E-1R2904, M-12BB02

5.1.15 Pressurizer Pressure Transmitters and Indicators

Pressurizer pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458 are included in the PFSSD design because they initiate Safety Injection on 2/4 low pressurizer pressure signals. Due to the installation of the Ovation DCS, a spurious high-pressure signal on a single or multiple pressure channel is not postulated to cause the spurious opening of the pressurizer PORVs. See Calculation XX-E-013 Appendix 1 for additional discussion. Pressurizer pressure indicators are included in the PFSSD design to provide operators with diagnostic capability.

Cable 11BBI16KA associated with pressure transmitter BBPT0455 is run in areas RB-3, RB-4, RB-5, RB-6 and RB-10. Cable 12BBI16LA associated with pressure transmitter BBPT0456 is run in area RB-4. Cable 13BBI16MA associated with pressure transmitter BBPT0457 is run in areas RB-3, RB-4, RB-7 and RB-10. Cable 14BBI16NA associated with pressure transmitter BBPT0458 is run in areas RB-4, RB-8 and RB-10. Based on the cable routing, a fire in certain areas of the reactor building could damage cables for at least two pressurizer pressure transmitters and initiate a spurious SIS. A spurious SIS is discussed in Section 5.1.20.

As stated in the previous paragraph, cables associated with all four pressurizer pressure transmitters are run in this area. Spurious operation of equipment as a result of damage to these cables is not postulated because the Ovation pressure control system uses 4-channel validation logic, which uses the 2nd highest signal as the validated signal and has built-in logic to detect and ignore failed inputs.

Pressurizer pressure indication needs to be available on at least one pressure indicator to provide diagnostic indication of a failed open pressurizer PORV. All four pressurizer pressure transmitters are located in area RB-4. As discussed in Section 1.0, the fire protection features in area RB-4 provide reasonable assurance that only one pressure transmitter will be damaged if the fire is in area RB-4. If the fire is outside area RB-4, then there is reasonable assurance that pressurizer pressure indicator BBPI0456 will be available, since BBPT0456 and associated cable 12BBI16LA are located only in RB-4. Protectowire heat detection zones 203, 204 and 216 run in area RB-4. If a fire is detected in any of these zones as indicated by KC008 fire alarm windows 138, 139 or 148, then Operators should monitor all four pressure indicators to determine which is the faulted indicator and rely on the remaining three.

Based on the above discussion, there is reasonable assurance that at least one pressurizer pressure indicator will be available if a fire occurs in this area.

References: E-15000, XX-E-013, E-13BB16, E-1F9301, E-1F9431, M-12BB02, DCP 13324

5.1.16 Containment Coolers

PFSSD requires containment cooling to maintain the containment environment within EQ limits. Two trains of containment cooling are provided. Train A uses containment coolers SGN01A and SGN01C. Train B uses containment coolers SGN01B and SGN01D. Only one train (2 coolers) is required to supply the needed containment cooling demand for PFSSD.

Power cables for each containment cooler are run in the reactor building. Power cables for Train A coolers are run from containment penetration ZNI268 in the North electrical penetration room (fire area RB-3) to the respective cooler motor. Power cables for Train B coolers are run from containment penetration ZSI219 in the South electrical penetration room (fire area RB-4) to the respective cooler motor. The power cables associated with each train of containment coolers are separated by at least 20 feet of horizontal separation with limited quantities of intervening combustibles. This separation, combined with the overall large volume of the reactor building, provides reasonable assurance that at least one train of containment coolers will be available if a fire occurs in the reactor building.

As stated earlier, ESW control valves to the containment coolers may be affected by a fire in the reactor building. However, based on the cable routing and the location of equipment, a single credible fire will not damage cables and equipment associated with both trains. Therefore, a single credible fire may damage cables and equipment associated with one train of coolers and essential service water, but the opposite train will remain available.

Based on this discussion, there is reasonable assurance that a fire in the reactor building will not cause the loss of containment cooling capability.

References: E-15000, XX-E-013, E-1F9441, E-13GN02, E-13GN02A, E-1R2421, E-1R2422A, E-1R2423, E-1R2512B, E-1R2512C, E-1R2522C, E-1R2522D

5.1.17 Pressurizer PORVs and Associated Block Valves

PFSSD requires that either the pressurizer power operated relief valve (PORV) or its associated block valve be closed. Either PORV BBPCV0455A or its associated block valve BBHV8000A needs to be closed and either PORV BBPCV0456A or its associated block valve BBHV8000B needs to be closed. All four valves are located in the same valve enclosure at elevation 2068’-8” with no suppression and detection or radiant energy shields installed.

The pressurizer PORVs are not considered high/low pressure interfaces. The valves are supplied power by an ungrounded 125 VDC system. Therefore, based on GL 86-10, consideration of multiple proper polarity hot shorts is not required. A single proper polarity hot short still needs to be considered.

Cables 11BBK40AB and 11BBK40AH associated with PORV BBPCV0455A are run in this area. Based on a review of drawing E-13BB40, it would take two concurrent proper polarity hot shorts to cause the PORV to spuriously open. Therefore, a fire in area RB is not postulated to open PORV BBPCV0455A due to damage to the control cables associated with the PORV.

Cables 14BBK40BB and 14BBK40BH associated with PORV BBPCV0456A are run in this area. Based on a review of drawing E-13BB40, it would take two concurrent proper polarity hot shorts to cause the PORV to spuriously open. Therefore, a fire in area RB is not postulated to open PORV BBPCV0456A due to damage to the control cables associated with the PORV.

Based on the above discussion, a fire in the reactor building will not cause PORVs BBPCV0455A or BBPCV0456A to spuriously open as a result of damage to the PORV control cables. However, as discussed in Section 5.1.15, the PORVs could open as a result of a spurious high-pressure signal. See Section 5.1.15 for actions to take if this occurs.

References: E-15000, XX-E-013, E-11NK01, E-13BB39, E-13BB40, E-13GT03, E-13RL05, M-12BB02, E-1R2612, E-1R2512A, E-1R2512B, E-1R2512C, E-1R2512D, E-1R2901, CR 13079, DCP 12944

5.1.18 CCW From RCP Containment Isolation Valves

For PFSSD, the component cooling water (CCW) system is used to provide cooling to the centrifugal charging pump (CCP) oil cooler, the RHR heat exchanger and the RHR pump seal cooler. In addition, the CCW system provides cooling to the RCP thermal barriers and is credited as a backup to RCP seal injection for maintaining seal cooling.

Valves EGHV0060, EGHV0062 and EGHV0132 are included in the PFSSD equipment list to ensure a reliable means of controlling CCW flow to various reactor building components. In certain situations, one or more of these valves is required to be either open or closed to accomplish the PFSSD function.

Valve EGHV0060 is included to ensure availability of CCW to the excess letdown heat exchanger during cold shutdown. For hot standby, the position of this valve (open or closed) will not impact PFSSD.

Valves BBHV0013, BBHV0014, BBHV0015, BBHV0016, EGHV0062 and EGHV0132 are included to evaluate availability of CCW to the RCP thermal barrier heat exchangers. During a loss of seal injection, the thermal barriers provide a redundant means of protecting the RCP seals and preventing a seal LOCA. In this case, the valves are required to remain open to ensure CCW flow to the thermal barrier cooling coils. If a loss of all seal cooling occurs, valves EGHV0062 and EGHV0132 are required to be closed to prevent steam void formation in the CCW piping and possible rupture due to water hammer.

Flow transmitters BBFT0017, BBFT0018, BBFT0019 and BBFT0020 are associated with valves BBHV0013, BBHV0014, BBHV0015 and BBHV0016, respectively. The flow transmitters monitor flow in the CCW piping and shut the valves on high CCW flow. Cables associated with these flow transmitters are run in this area. Damage to these cables could cause a spurious high CCW flow signal and close the valves. Damage to the valve cables could prevent re-opening the valves. Loss of thermal barrier cooling would be indicated in the control room as a reduction in flow on flow indicators EGFI0128 and EGFI0129. Therefore, operators can diagnose a loss of thermal barrier cooling.

A fire in the Reactor Building will not cause a loss of seal injection. All electrically operated components associated with seal injection are located outside the Reactor Building and will be unaffected by a fire in area RB. Therefore, spurious operation of valves BBHV0013,

BBHV0014, BBHV0015, BBHV0016, EGHV0062 and EGHV0132 will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13BB03, E-13BB28, E-13EG06, E-13EG17A, E-1F9303, M-12EG03

5.1.19 Normal Pressurizer Spray Valves

Pressurizer spray valves BBPCV0455B and BBPCV0455C are analyzed in the PFSSD analysis because spurious operation of the valves could cause a depressurization of the RCS which could lead to boiling in the core.

The pressurizer spray valves are located in fire area RB-10. Cables 15BBI19AB and 15BBI19BB associated with the valves are run in fire areas RB-1, RB-3, RB-6 and RB-10. Damage to the cables in the event of a fire could cause the spurious opening of the spray valves.

The pressurizer normal spray valves operate off a signal from the Ovation pressurizer pressure control system. The operation of the pressure control system is discussed in Calculation XX-E-013.

Instrument cables associated with all four pressurizer pressure transmitters (BBPT0455, BBPT0456, BBPT0457 and BBPT0458) are run in fire area RB. Due to the fire protection features discussed in Section 1.0, at least one pressure transmitter will be available. Damage to pressure transmitter cables could send a spurious high-pressure signal to the pressure control system. However, as discussed in Calculation XX-E-013, Appendix 1, damage to a single or multiple pressure channels will not cause the spurious operation of the pressurizer spray valves due to the Ovation 4-channel validation logic, which uses the 2nd highest signal as the validated signal and has built-in logic to detect and ignore failed inputs. Therefore, spurious opening of the normal pressurizer spray valves due to a spurious high-pressure signal is not postulated.

The pressurizer spray valves are electro/pneumatic operated and loss of air pressure will close the valves. The air supply comes from the compressed air system. Closing valve KAFV0029 using KAHIS0029 on RL024 will isolate compressed air to containment which will cause the pressurizer spray valves to close or prevent them from opening. Based on WCNOC-CP-002, spray flow needs to be stopped within 50 minutes. Since this is a control room action, this can be completed well within 50 minutes.

Based on the above discussion, the pressurizer spray valves could spuriously open if a fire occurs in this area. Pressurizer spray can be stopped by closing valve KAFV0029 from the main control room. Pressurizer pressure indication is available using BBPI0456 unless a fire alarm is indicated on alarm windows 138, 139 or 148. If this is the case, then monitor BBPI0455A, BBPI0456, BBPI0457 and BBPI0458 to determine an accurate pressure reading. At least three of these indicators should trend the same.

References: E-15000, XX-E-013, E-13BB19, E-13KA02, M-12BB02, M-761-02128, M-761-02129, WCNOC-CP-002, CR 25002, DCP 13324

5.1.20 Safety Injection and Containment Spray

Calculation XX-E-013, Appendix 1 (PFSSD Support Section) provides a detailed discussion about the potential PFSSD impact of a spurious safety injection signal (SIS) and spurious containment spray actuation signal (CSAS). This section discusses the specific PFSSD impact if a fire occurs in this area.

A spurious CSAS is not credible if a fire occurs in area RB.

Pressurizer pressure transmitters BBPT0455, BBPT0456, BBPT0457 and BBPT0458 and associated cables are located in area RB. Section 5.1.15 provides a detailed description of where these cables and components are located. Consequently, a fire in area RB can cause a spurious SIS due to low pressurizer pressure.

A spurious SIS starts the charging sequence which starts the CCPs and opens the BIT flowpath valves. For a fire in this area, the BIT flowpath valves are unaffected and would open on a SIS. The RWST valves are unaffected and would open on a SIS. Also, the CCP mini flow valves are unaffected and CCW flow to the seal water heat exchanger is unaffected to ensure cooling of the recirc flow and RCP seal return. The CCW system is also available to provide cooling to the CCP oil coolers. Therefore, the charging pumps will not be affected by a spurious SIS caused by a fire in this area.

A start of the CCW system will not adversely impact the system. Both Trains of ESW are unaffected and will start on a spurious SIS, providing necessary cooling water to the CCW heat exchangers.

A start of the AFW pumps will not adversely impact PFSSD. All three AFW pumps are unaffected by a fire in this area. Suction from the CST to the AFW pumps is unaffected. Discharge flow will either return to the CST or flow to the steam generators through the discharge control valves. Therefore, the AFW pumps are unaffected by a spurious SIS caused by a fire in this area.

A start of the RHR pumps due to a spurious SIS will not adversely impact either pump. The RWST supply to the pumps is not affected and the recirculation valves will remain in the open position. Component cooling water is available to both RHR heat exchangers. Operators will have time to terminate the spurious SIS and stop the pumps.

Based on the above discussion, a spurious SIS can occur if a fire occurs in this area. Credited PFSSD equipment will not be damaged by the spurious SIS. Therefore, a spurious SIS will not adversely impact PFSSD.

References: E-15000, XX-E-013, E-13BB16, E-13EM01, E-13EN03, E-13GN05, E-1F9431, E-1F9432, E-1F9433

5.1.21 Seal Water Return Containment Isolation Valve

Seal water return containment isolation valve BGHV8112 is credited for a fire in area A-16S to prevent seal leakoff flow from entering the CCP suction. This is because a fire in A-16S could cause a loss of CCW cooling flow to the seal water heat exchanger and allow elevated temperature fluid to enter the CCP and possibly damage the pump.

A fire in area RB does not credit valve BGHV8112. Therefore, damage to the valve in the event of a fire will have no adverse impact on PFSSD

References: E-15000, XX-E-013

5.2 PFSSD CABLE EVALUATION

Table RB-8 lists all the PFSSD cables (S. in E-15000) located in fire area RB. The applicable evaluation section is also listed in Table RB-8.

Table RB-7 PFSSD Cables Located in Fire Area RB					
Cable #	**Location**	**Primary PFSSD Equipment**	**Cable Function** (P) Power (C) Control (I) Instrumentation	**Evaluation Section**	**Comments**
11AEI08AA	RB-2, RB-3	AELT0501	I	5.1.9	SG A Wide Range Water Level
11AEI08BA	RB-2, RB-3, RB-8	AELT0529	I	5.1.9	SG B Narrow Range Water Level
11AEI08CA	RB-2, RB-3, RB-8	AELT0539	I	5.1.9	SG C Narrow Range Water Level
11AEI12AA	RB-3, RB-7	AELT0551	I	5.1.9	SG A Narrow Range Water Level
11AEI12DA	RB-3, RB-4, RB-5, RB-6, RB-10	AELT0554	I	5.1.9	SG D Narrow Range Water Level Raceway is partially wrapped with Darmatt 1-hr
11BBG03AE	RB-3	BBHV0013	C	5.1.18	RCP A Thermal Barrier Return Iso Valve
11BBG03AF	RB-3	BBHV0013	P	5.1.18	RCP A Thermal Barrier Return Iso Valve
11BBG03BE	RB-2, RB-3	BBHV0014	C	5.1.18	RCP B Thermal Barrier Return Iso Valve
11BBG03BF	RB-2, RB-3	BBHV0014	P	5.1.18	RCP B Thermal Barrier Return Iso Valve
11BBG03CE	RB-2, RB-3, RB-8	BBHV0015	C	5.1.18	RCP C Thermal Barrier Return Iso Valve
11BBG03CF	RB-2, RB-3, RB-8	BBHV0015	P	5.1.18	RCP C Thermal Barrier Return Iso Valve
11BBG03DE	RB-2, RB-3, RB-4, RB-7	BBHV0016	C	5.1.18	RCP D Thermal Barrier Return Iso Valve
11BBG03DF	RB-2, RB-3, RB-4, RB-7	BBHV0016	P	5.1.18	RCP D Thermal Barrier Return Iso Valve
11BBG39AD	RB-3, RB-5, RB-10	BBHV8000A	P	5.1.17	Pressurizer PORV Block Valve
11BBG39AG	RB-3, RB-5, RB-10	BBHV8000A	C	5.1.17	Pressurizer PORV Block Valve
11BBI15HA	RB-1, RB-3, RB-5, RB-6, RB-10	BBTE0413A	I	5.1.4	RCS Loop 1 Hot Leg Temperature Element
11BBI15JA	RB-1, RB-2, RB-3, RB-10	BBTE0423A	I	5.1.4	RCS Loop 2 Hot Leg Temperature Element
11BBI15KA	RB-1, RB-2, RB-3	BBTE0443B	I	5.1.4	RCS Loop 4 Cold Leg Temperature Element
11BBI15LA	RB-1, RB-2, RB-3	BBTE0433B	I	5.1.4	RCS Loop 3 Cold Leg Temperature Element

Table RB-7
PFSSD Cables Located in Fire Area RB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BBI16KA	RB-3, RB-4, RB-5, RB-10	BBPT0455	I	5.1.15 5.1.20	Pressurizer Pressure Transmitter Raceway is partially wrapped with Darmatt 1-hr
11BBI16PA	RB-3, RB-4, RB-5, RB-10	BBLT0459	I	5.1.14	Pressurizer Level Transmitter Raceway is partially wrapped with Darmatt 1-hr
11BBI28AB	RB-3	BBFT0017	I	5.1.18	BBHV0013 Flow Control
11BBI28BB	RB-2, RB-3	BBFT0018	I	5.1.18	BBHV0014 Flow Control
11BBI28CB	RB-2, RB-3, RB-8	BBFT0019	I	5.1.18	BBHV0015 Flow Control
11BBI28DB	RB-3, RB-4, RB-10	BBFT0020	I	5.1.18	BBHV0016 Flow Control
11BBK30AB	RB-3, RB-5, RB-10	BBHV8001A	C	5.1.10	Reactor Head Vent Valve
11BBK30CB	RB-3, RB-5, RB-6, RB-10	BBHV8002A	C	5.1.10	Reactor Head Vent Valve
11BBK40AB	RB-3, RB-5, RB-6, RB-10	BBPCV0455A	C	5.1.17	Pressurizer PORV
11BBK40AH	RB-3, RB-5, RB-6, RB-10	BBPCV0455A	P	5.1.17	Pressurizer PORV
11BGK48CA	RB-1, RB-2, RB-3	BGHV8153A	C	5.1.6	Excess Letdown Isolation Valve
11BGK48DA	RB-1, RB-2, RB-3	BGHV8154A	C	5.1.6	Excess Letdown Isolation Valve
11EFG09AD	RB-2, RB-3	EFHV0033	P	5.1.11	ESW A to Containment Air Coolers A & C
11EFG09AE	RB-2, RB-3	EFHV0033	C	5.1.11	ESW A to Containment Air Coolers A & C
11EFG09CD	RB-2, RB-3	EFHV0045	P	5.1.11	ESW A from Containment Air Coolers A & C
11EFG09CE	RB-2, RB-3	EFHV0045	C	5.1.11	ESW A from Containment Air Coolers A & C
11EGG17BE	RB-2, RB-3	EGHV0132	C	5.1.18	CCW from RCP Thermal Barrier
11EGG17BF	RB-2, RB-3	EGHV0132	P	5.1.18	CCW from RCP Thermal Barrier
11EJG05AD	RB-2, RB-3	EJHV8701A	P	5.1.3	RHR Loop 1 Inlet Isolation Valve

Table RB-7
PFSSD Cables Located in Fire Area RB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11EJG05AE	RB-2, RB-3	EJHV8701A	C	5.1.3	RHR Loop 1 Inlet Isolation Valve
11EJG05BD	RB-2, RB-3	EJHV8701B	P	5.1.3	RHR Loop 2 Inlet Isolation Valve
11EJG05BE	RB-2, RB-3	EJHV8701B	C	5.1.3	RHR Loop 2 Inlet Isolation Valve
11EJG06AE	RB-1, RB-2, RB-3	EJHV8811A	C	5.1.5	Interlock with valve BBPV8702A
11EJG06AH	RB-2, RB-3	EJHV8811A	C	5.1.5	Interlock with valve EJHV8701A
11EPG02AC	RB-2, RB-3	EPHV8808A	P	5.1.13	Accumulator A Isolation Valve
11EPG02AD	RB-2, RB-3	EPHV8808A	C	5.1.13	Accumulator A Isolation Valve
11EPG02BC	RB-2, RB-3	EPHV8808C	P	5.1.13	Accumulator C Isolation Valve
11EPG02BD	RB-2, RB-3	EPHV8808C	C	5.1.13	Accumulator C Isolation Valve
11GNG02AA	RB-3, RB-5, RB-6	DSGN01A	P	5.1.16	Containment Cooler A Motor
11GNG02AB	RB-3, RB-5, RB-6	DSGN01A	P	5.1.16	Containment Cooler A Motor
11GNG02CA	RB-3, RB-5, RB-6	DSGN01C	P	5.1.16	Containment Cooler C Motor
11GNG02CB	RB-3, RB-5, RB-6	DSGN01C	P	5.1.16	Containment Cooler C Motor
11SES01B4	RB-1, RB-11	SE02	I	5.1.1	Source Range Detector
11SES01BK	RB-1, RB-2, RB-3	SE02	I	5.1.1	Source Range Detector
11SES07AA	RB-1, RB-2, RB-11	SE04	I	5.1.1	Source Range Detector
11SES07AB	RB-1, RB-2, RB-3	SE04	I	5.1.1	Source Range Detector
12AEI08EA	RB-2, RB-4, RB-7	AELT0519	I	5.1.9	SG A Narrow Range Water Level
12AEI08FA	RB-4, RB-7	AELT0549	I	5.1.9	SG D Narrow Range Water Level
12AEI08GA	RB-2, RB-4	AELT0502	I	5.1.9	SG B Wide Range Water Level
12AEI12BA	RB-2, RB-4, RB-8	AELT0552	I	5.1.9	SG B Narrow Range Water Level
12AEI12CA	RB-2, RB-4, RB-8	AELT0553	I	5.1.9	SG C Narrow Range Water Level

Table RB-7
PFSSD Cables Located in Fire Area RB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
12BBI15EA	RB-1, RB-4, RB-10	BBTE0413B	I	5.1.4	RCS Loop 1 Cold Leg Temperature Element
12BBI15HA	RB-1, RB-4, RB-10	BBTE0423B	I	5.1.4	RCS Loop 2 Cold Leg Temperature Element
12BBI15JA	RB-1, RB-4, RB-10	BBTE0443A	I	5.1.4	RCS Loop 4 Hot Leg Temperature Element
12BBI15KA	RB-1, RB-4, RB-10	BBTE0433A	I	5.1.4	RCS Loop 3 Hot Leg Temperature Element
12BBI16LA	RB-4	BBPT0456	I	5.1.15 5.1.20	Pressurizer Pressure Transmitter
12BBI16QA	RB-4	BBLT0460	I	5.1.14	Pressurizer Level Transmitter
12SES02B4	RB-1, RB-11	SE06	I	5.1.1	Source Range Detector
12SES02BK	RB-1, RB-2, RB-4	SE06	I	5.1.1	Source Range Detector
13AEI08GA	RB-2, RB-3	AELT0503	I	5.1.9	SG C Wide Range Water Level
13AEI08HA	RB-2, RB-3, RB-7	AELT0518	I	5.1.9	SG A Narrow Range Water Level
13AEI08JA	RB-2, RB-3, RB-7, RB-8	AELT0528	I	5.1.9	SG B Narrow Range Water Level
13AEI08KA	RB-2, RB-3, RB-8	AELT0538	I	5.1.9	SG C Narrow Range Water Level
13AEI08LA	RB-3, RB-7	AELT0548	I	5.1.9	SG D Narrow Range Water Level
13BBI16MA	RB-3, RB-4, RB-7, RB-10	BBPT0457	I	5.1.15 5.1.20	Pressurizer Pressure Transmitter
14AEI08LA	RB-2, RB-4, RB-7	AELT0504	I	5.1.9	SG D Wide Range Water Level
14AEI08NA	RB-2, RB-4, RB-7	AELT0517	I	5.1.9	SG A Narrow Range Water Level
14AEI08PA	RB-2, RB-4, RB-8	AELT0527	I	5.1.9	SG B Narrow Range Water Level
14AEI08QA	RB-2, RB-4, RB-8	AELT0537	I	5.1.9	SG C Narrow Range Water Level
14AEI08RA	RB-4	AELT0547	I	5.1.9	SG D Narrow Range Water Level
14BBG12AH	RB-1, RB-2, RB-4	BBPV8702A	P	5.1.3	RHR Loop 1 Inlet Isolation Valve

Table RB-7 PFSSD Cables Located in Fire Area RB					
Cable #	**Location**	**Primary PFSSD Equipment**	**Cable Function** (P) Power (C) Control (I) Instrumentation	**Evaluation Section**	**Comments**
14BBG12AJ	RB-1, RB-2, RB-4	BBPV8702A	C	5.1.3	RHR Loop 1 Inlet Isolation Valve
14BBG12BH	RB-1, RB-2, RB-4	BBPV8702B	P	5.1.3	RHR Loop 2 Inlet Isolation Valve
14BBG12BJ	RB-1, RB-2, RB-4	BBPV8702B	C	5.1.3	RHR Loop 2 Inlet Isolation Valve
14BBG39BD	RB-4, RB-10	BBHV8000B	P	5.1.17	Pressurizer PORV Block Valve
14BBG39BG	RB-4, RB-10	BBHV8000B	C	5.1.17	Pressurizer PORV Block Valve
14BBI16NA	RB-4, RB-8, RB-10	BBPT0458	I	5.1.15 5.1.20	Pressurizer Pressure Transmitter
14BBK30BB	RB-2, RB-4, RB-5, RB-10	BBHV8001B	C	5.1.10	Reactor Head Vent Valve
14BBK30DB	RB-2, RB-4, RB-5, RB-8, RB-10	BBHV8002B	C	5.1.10	Reactor Head Vent Valve
14BBK40BB	RB-4, RB-10	BBPCV0456A	C	5.1.17	Pressurizer PORV
14BBK40BH	RB-4, RB-10	BBPCV0456A	P	5.1.17	Pressurizer PORV
14BGK48AA	RB-1, RB-2, RB-4	BGHV8153B	C	5.1.6	Excess Letdown Isolation Valve
14BGK48BA	RB-1, RB-2, RB-4, RB-8	BGHV8154B	C	5.1.6	Excess Letdown Isolation Valve
14EFG09BD	RB-2, RB-4	EFHV0034	P	5.1.11	ESW B to Containment Air Coolers B & D
14EFG09BE	RB-2, RB-4	EFHV0034	C	5.1.11	ESW B to Containment Air Coolers B & D
14EFG09DD	RB-2, RB-4	EFHV0046	P	5.1.11	ESW B from Containment Air Coolers B & D
14EFG09DE	RB-2, RB-4	EFHV0046	C	5.1.11	ESW B from Containment Air Coolers B & D
14EGG10AG	RB-2, RB-4	EGHV0062	P	5.1.18	CCW from RCP Thermal Barrier
14EGG10AH	RB-2, RB-4	EGHV0062	C	5.1.18	CCW from RCP Thermal Barrier
14EJG06BE	RB-1, RB-2, RB-4	EJHV8811B	C	5.1.5	Interlock with BBPV8702B

Table RB-7 PFSSD Cables Located in Fire Area RB					
Cable #	**Location**	**Primary PFSSD Equipment**	**Cable Function** (P) Power (C) Control (I) Instrumentation	**Evaluation Section**	**Comments**
14EJG06BH	RB-2, RB-4	EJHV8811B	C	5.1.5	Interlock with EJHV8701B
14EMK04CC	RB-2, RB-4	EMHV8843	C	5.1.12	SIS Test Line Isolation Valve
14EMK04EC	RB-2, RB-4	EMHV8871	C	5.1.12	SIS Test Line Isolation Valve
14EPG02CC	RB-2, RB-4, RB-8	EPHV8808B	P	5.1.13	Accumulator B Isolation Valve
14EPG02CD	RB-2, RB-4, RB-8	EPHV8808B	C	5.1.13	Accumulator B Isolation Valve
14EPG02DC	RB-2, RB-4	EPHV8808D	P	5.1.13	Accumulator D Isolation Valve
14EPG02DD	RB-2, RB-4	EPHV8808D	C	5.1.13	Accumulator D Isolation Valve
14GNG02BA	RB-4, RB-8, RB-10	DSGN01B	P	5.1.16	Containment Cooler B Motor
14GNG02BB	RB-4, RB-8, RB-10	DSGN01B	P	5.1.16	Containment Cooler B Motor
14GNG02DA	RB-4, RB-10	DSGN01D	P	5.1.16	Containment Cooler D Motor
14GNG02DB	RB-4, RB-10	DSGN01D	P	5.1.16	Containment Cooler D Motor
14SES07AA	RB-1, RB-11	SE08	I	5.1.1	Source Range Detector
14SES07AB	RB-1, RB-2, RB-4	SE08	I	5.1.1	Source Range Detector
15BBA01AG	RB-1, RB-3	DPBB01A	C	5.2.1	Reactor Coolant Pump A Motor
15BBA01BG	RB-1, RB-3	DPBB01B	C	5.2.1	Reactor Coolant Pump B Motor
15BBI19AB	RB-1, RB-3, RB-10	BBPCV0455B	I	5.1.19	Pressurizer Spray Valve
15BBI19BB	RB-1, RB-3, RB-10	BBPCV0455C	I	5.1.19	Pressurizer Spray Valve
15BGK10AB	RB-1, RB-3	BGLCV0459	C	5.1.7	Letdown Isolation Valve
15BGK10AE	RB-3, RB-8	BGLCV0459	C	5.1.7	Letdown Isolation Valve
15BGK10AF	RB-8	BGLCV0459	C	5.1.7	Interlock to Valve BGHV8149A
15BGK10AG	RB-8	BGLCV0459	C	5.1.7	Interlock to Valve BGHV8149B
15BGK10AH	RB-8	BGLCV0459	C	5.1.7	Interlock to Valve BGHV8149C

Table RB-7
PFSSD Cables Located in Fire Area RB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15BGK10BB	RB-1, RB-3	BGLCV0460	C	5.1.7	Letdown Isolation Valve
15BGK10BE	RB-3, RB-8	BGLCV0460	C	5.1.7	Letdown Isolation Valve
15BGK10BF	RB-8	BGLCV0460	C	5.1.7	Interlock to Valve BGHV8149A
15BGK10BG	RB-8	BGLCV0460	C	5.1.7	Interlock to Valve BGHV8149B
15BGK10BH	RB-8	BGLCV0460	C	5.1.7	Interlock to Valve BGHV8149C
15BGK35AC	RB-3, RB-8	BGHV8149A	C	5.1.7	Letdown Orifice Isolation Valve
15BGK35AE	RB-1, RB-3	BGHV8149A	C	5.1.7	Letdown Orifice Isolation Valve
15BGK35AF	RB-1	BGHV8149A	C	5.1.7	Letdown Orifice Isolation Valve
15BGK35AG	RB-1	BGHV8149A	C	5.1.7	Letdown Orifice Isolation Valve
15BGK35BC	RB-3, RB-8	BGHV8149B	C	5.1.7	Letdown Orifice Isolation Valve
15BGK35BE	RB-1, RB-3	BGHV8149B	C	5.1.7	Letdown Orifice Isolation Valve
15BGK35BF	RB-1	BGHV8149B	C	5.1.7	Letdown Orifice Isolation Valve
15BGK35BG	RB-1	BGHV8149B	C	5.1.7	Letdown Orifice Isolation Valve
15BGK35CC	RB-3, RB-8	BGHV8149C	C	5.1.7	Letdown Orifice Isolation Valve
15BGK35CE	RB-1, RB-3	BGHV8149C	C	5.1.7	Letdown Orifice Isolation Valve
15BGK35CF	RB-1	BGHV8149C	C	5.1.7	Letdown Orifice Isolation Valve
15BGK35CG	RB-1	BGHV8149C	C	5.1.7	Letdown Orifice Isolation Valve
15EMK05EB	RB-2, RB-3	EMHV8882	C	5.1.12	SIS Test Line Isolation Valve
16BBA01CG	RB-1, RB-4, RB-8	DPBB01C	C	5.2.1	Reactor Coolant Pump C Motor
16BBA01DG	RB-1, RB-4	DPBB01D	C	5.2.1	Reactor Coolant Pump D Motor

5.2.1 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling or spuriously open pressurizer spray is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs. Calculation WCNOC-CP-002 shows that if pressurizer spray spuriously actuates, the spray flow needs to be stopped within 50 minutes.

One control cable associated with each reactor coolant pump is run in fire area RB. Damage to these cables in the event of a fire could prevent operators from stopping the RCPs from the control room. However, a fire in RB will not cause a loss of all seal cooling because seal injection remains available. As discussed in Section 5.1.19, if pressurizer spray spuriously operates, operators can stop the spray by isolating air to the valve from the control room. Therefore, tripping the RCPs is not required to mitigate spurious pressurizer spray.

Based on the above discussion, the inability to trip the RCPs from the control room will have no adverse impact on PFSSD. If pressurizer spray spuriously actuates, the valves can be closed by isolating air to the valves from the control room. In addition, seal injection is unaffected by a fire in area RB. Therefore, the RCPs do not have to be tripped in the event of a fire in area RB.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1

FIRE AREA RW

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

The Radwaste Building, excluding the radwaste tunnel, is sub-divided into three fire areas in E-15000 (Setroute). In general, each fire area includes the areas described in Table RW-1. For the radwaste tunnel fire area analysis, see fire area RW-1. For a complete list of rooms in the Radwaste Building, see E-1F9905, Attachment A.

Table RW-1
Fire Areas Located in Fire Area RW

FIRE AREAS	DESCRIPTION
RW A	Radwaste Building 1976' Elevation
RW B	Radwaste Building 2000' Elevation
RW C	Radwaste Building 2022', 2031'-6", 2040'-6", 2047' Elevations

The radwaste building is provided with automatic fire detection throughout most areas. Automatic fire suppression is provided in the dry waste compactor area and in the radwaste storage building. Fire area RW is separated from all adjoining fire areas by minimum 3-hour fire resistance rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table RW-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the potential fire impact on some of the more significant PFSSD equipment, see Section 8.0 of the Fire Area Analysis Narrative section.

Table RW-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RW

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blowdown system are satisfied. Steam generator blowdown is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A, located on the RL024 panel in the main control room.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.

Table RW-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RW

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.

Table RW-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RW

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
PA	13.8kV	S	Breakers PA0106 and PA0207 could trip. This will not affect PFSSD since redundant capability is available.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.

Table RW-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RW			
System	**System Name**	**PFSSD Function***	**Comments**
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area RW. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area RW.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA RW

PFSSD components (S. in E-15000) located in fire area RW are shown in Table RW-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table RW-3.

Table RW-3 PFSSD Equipment Located in Fire Area RW				
Room #	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
7209	BM157	Steam Generator Blowdown Control Panel	5.1.1	
7209	BMHIS0001C	BMHV0001 Solenoid Valve Handswitch	5.1.1	
7209	BMHIS0002C	BMHV0002 Solenoid Valve Handswitch	5.1.1	
7209	BMHIS0003C	BMHV0003 Solenoid Valve Handswitch	5.1.1	
7209	BMHIS004C	BMHV0004 Solenoid Valve Handswitch	5.1.1	
7208	RP188A	Auxiliary Relay Rack	5.1.1	

5.1.1 Steam Generator Blowdown to Blowdown Flash Tank Isolation Valves

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent uncontrolled cooldown. Post-fire safe shutdown credits two methods for isolating blowdown. The first method uses the blowdown control hand switches located in the main control room. The second method uses the blowdown control hand switches located on the blowdown control panel (BM157) in the radwaste control room.

A fire in the radwaste building could damage several cables and components associated with the BM157 panel mounted hand switches for each of the blowdown valves. Damage to these cables and components could impact the ability to close the valves from BM157 in the Radwaste Control Room.

The normal means of closing the blowdown valves, using the RL024 mounted hand switches in the Main Control Room, remains available. Therefore, a fire in area RW will not prevent the closure of valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004.

References: E-15000, XX-E-013, E-13BM04, E-13BM06A, E-13BM06B, E-13BM06C, E-13BM06D, E-13BM16, E-1F9101, J-02BM04, M-12BM01

5.2 PFSSD CABLE EVALUATION

Table RW-4 lists all the PFSSD cables (S. in E-15000) located in fire area RW. The applicable evaluation section is also listed in Table RW-4.

Table RW-4
PFSSD Cables Located in Fire Area RW

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15BMK06AA	7113, 7208, 7209	BMHV0001	C	5.1.1	SG A to Blowdown Flash Tank Isolation Valve
15BMK06AB	7113, 7208, 7209	BMHV0001	C	5.1.1	SG A to Blowdown Flash Tank Isolation Valve
15BMK06AC	7113, 7208, 7209	BMHV0001	C	5.1.1	SG A to Blowdown Flash Tank Isolation Valve
15BMK06AD	7208, 7209	BMHV0001	C	5.1.1	SG A to Blowdown Flash Tank Isolation Valve
15BMK06BA	7113, 7208, 7209	BMHV0002	C	5.1.1	SG B to Blowdown Flash Tank Isolation Valve
15BMK06BB	7113, 7208, 7209	BMHV0002	C	5.1.1	SG B to Blowdown Flash Tank Isolation Valve
15BMK06BC	7113, 7208, 7209	BMHV0002	C	5.1.1	SG B to Blowdown Flash Tank Isolation Valve
15BMK06BD	7208, 7209	BMHV0002	C	5.1.1	SG B to Blowdown Flash Tank Isolation Valve
15BMK06CA	7113, 7208, 7209	BMHV0003	C	5.1.1	SG C to Blowdown Flash Tank Isolation Valve
15BMK06CB	7113, 7208, 7209	BMHV0003	C	5.1.1	SG C to Blowdown Flash Tank Isolation Valve
15BMK06CC	7113, 7208, 7209	BMHV0003	C	5.1.1	SG C to Blowdown Flash Tank Isolation Valve
15BMK06CD	7208, 7209	BMHV0003	C	5.1.1	SG C to Blowdown Flash Tank Isolation Valve
15BMK06DA	7113, 7208, 7209	BMHV0004	C	5.1.1	SG D to Blowdown Flash Tank Isolation Valve
15BMK06DB	7113, 7208, 7209	BMHV0004	C	5.1.1	SG D to Blowdown Flash Tank Isolation Valve
15BMK06DC	7113, 7208, 7209	BMHV0004	C	5.1.1	SG D to Blowdown Flash Tank Isolation Valve
15BMK06DD	7208, 7209	BMHV0004	C	5.1.1	SG D to Blowdown Flash Tank Isolation Valve
15BMK16AA	7113, 7208, 7209	BM157	P	5.1.1	Steam Generator Blowdown Control Panel
15PGA10BA	7113	PA0106	C	5.2.1	Load Centers PG15, PG17 and PG19 Fdr Bkr
16PGA11AC	7113	PA0207	C	5.2.1	Load Centers PG14, PG18, PG20 and PG24 Fdr Bkr

5.2.1 Load Center Feeder Breakers PA0106 and PA0207

Load center feeder breakers PA0106 and PA0207 are credited for PFSSD because they supply power to credited non-safety related loads. Cables 15PGA10BA, associated with PA0106, and 16PGA11AC, associated with PA0207, run in this area. A fire induced short circuit in these cables will trip the associated breaker.

Breaker PA0106 supplies power to the following PFSSD components:

- PG19GCR217 – MCB Misc. Power Circuits RL023
- PG19GFR3 – Instr. Bus Transformer Alt. Feed XPN07D

PFSSD components supplied power from PG19GCR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG19GFR3 is credited as one source of power to PN07. The redundant source of power from NG01BEF4 is unaffected by a fire in this area.

Based on the above discussion, loss of breaker PA0106 will not adversely affect PFSSD if a fire occurs in this area.

Breaker PA0207 supplies power to the following PFSSD components:

- PG20GBR217 – MCB Misc. Power Circuits RL023
- PG20GER5 – Instr. Bus Transformer Alt. Feed XPN08D

PFSSD components powered from PG20GBR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG20GER5 is credited as one source of power to PN08. The redundant source of power from NG02BBF1 is unaffected by a fire in this area.

Based on the above discussion, loss of breaker PA0207 will not adversely affect PFSSD if a fire occurs in this area.

Damage to cables 15PGA10BA and 16PGA11AC due to a fire in this area will not adversely impact the ability to achieve and maintain PFSSD due to the availability of redundant components that are unaffected by a fire in this area.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-11PK02, E-13PG10, E-13PG11, E-13RL07, E-13SC12, E-1F9421, E-1F9422C, KD-7496

FIRE AREA RW-1

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area RW-1 is the radwaste tunnel located between the 1976 elevation of the Radwaste Building and the 1974 elevation of the Auxiliary Building and includes the rooms listed in Table RW-1-1.

Table RW-1-1
Rooms Located in Fire Area RW-1

ROOM #	DESCRIPTION
7133	Electrical Chase, Non Radioactive Pipe Tunnel and Personnel Access
7134	Radioactive Pipe Tunnel

Fire area RW-1 is protected with automatic fire detection in room 7133 only. There is no automatic suppression installed. The area is separated from all adjacent areas by minimum 3-hour fire resistant rated construction.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table RW-1-1 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the potential fire impact on some of the more significant PFSSD equipment, see Section 8.0 of the Fire Area Analysis Narrative section.

Table RW-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RW-1

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
BM	Steam Generator Blowdown System	R, M, H	All PFSSD functions associated with the steam generator blowdown system are satisfied. Steam generator blowdown is isolated by closing valves BMHV0001, BMHV0002, BMHV0003 and BMHV0004 using BMHIS0001A, BMHIS0002A, BMHIS0003A and BMHIS0004A, located on the RL024 panel in the main control room.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.

Table RW-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RW-1

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.

Table RW-1-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RW-1			
System	**System Name**	**PFSSD Function***	**Comments**
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.

Table RW-1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RW-1

System	System Name	PFSSD Function*	Comments
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RW-1.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area RW-1. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area RW-1.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA RW-1

There are no PFSSD components (S. in E-15000) located in fire area RW-1. This fire area only contains PFSSD cables associated with components located in other fire areas.

5.2 PFSSD CABLE EVALUATION

Table RW-1-3 lists all the PFSSD cables (S. in E-15000) located in fire area RW-1. The applicable evaluation section is also listed in Table RW-1-3.

Table RW-1-3
PFSSD Cables Located in Fire Area RW-1

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15BMK06AA	7133	BMHV0001	C	5.2.1	SG A to Blowdown Flash Tank Isolation Valve
15BMK06AB	7133	BMHV0001	C	5.2.1	SG A to Blowdown Flash Tank Isolation Valve
15BMK06AC	7133	BMHV0001	C	5.2.1	SG A to Blowdown Flash Tank Isolation Valve
15BMK06BA	7133	BMHV0002	C	5.2.1	SG B to Blowdown Flash Tank Isolation Valve
15BMK06BB	7133	BMHV0002	C	5.2.1	SG B to Blowdown Flash Tank Isolation Valve
15BMK06BC	7133	BMHV0002	C	5.2.1	SG B to Blowdown Flash Tank Isolation Valve
15BMK06CA	7133	BMHV0003	C	5.2.1	SG C to Blowdown Flash Tank Isolation Valve
15BMK06CB	7133	BMHV0003	C	5.2.1	SG C to Blowdown Flash Tank Isolation Valve
15BMK06CC	7133	BMHV0003	C	5.2.1	SG C to Blowdown Flash Tank Isolation Valve
15BMK06DA	7133	BMHV0004	C	5.2.1	SG D to Blowdown Flash Tank Isolation Valve
15BMK06DB	7133	BMHV0004	C	5.2.1	SG D to Blowdown Flash Tank Isolation Valve
15BMK06DC	7133	BMHV0004	C	5.2.1	SG D to Blowdown Flash Tank Isolation Valve
15BMK16AA	7133	PK5123	P	5.2.1	Power Source for Panel BM157
15PGA10BA	7133	PA0106	C	5.2.2	Load Centers PG15, PG17 and PG19 Fdr Bkr
16PGA11AC	7133	PA0207	C	5.2.2	Load Centers PG14, PG18, PG20 and PG24 Fdr Bkr

5.2.1 Steam Generator Blowdown to Blowdown Flash Tank Isolation Valves

The reactivity control function requires the steam generator blowdown to blowdown flash tank valves (BMHV0001, BMHV0002, BMHV0003, and BMHV0004) be closed to prevent reactivity addition from uncontrolled cooldown.

Several cables associated with the BM157 panel mounted hand switches for each of the valves run through this fire area. Damage to these cables could impact the ability to close the valves from BM157 in the Radwaste Control Room.

The normal means of closing the blowdown valves, using the RL024 mounted hand switches in the Main Control Room, remains available. Therefore, a fire in area RW-1 will not prevent the closure of valves BMHV0001, BMHV0002, BMHV0003, and BMHV0004.

References: E-15000, XX-E-013, E-13BM04, E-13BM06A, E-13BM06B, E-13BM06C, E-13BM06D, E-13BM16, E-1F9101, J-02BM04, M-12BM01

5.2.2 Load Center Feeder Breakers PA0106 and PA0207

Load center feeder breakers PA0106 and PA0207 are credited for PFSSD because they supply power to credited non-safety related loads. Cables 15PGA10BA, associated with PA0106, and 16PGA11AC, associated with PA0207, run in this area. A fire induced short circuit in these cables will trip the associated breaker.

Breaker PA0106 supplies power to the following PFSSD components:

- PG19GCR217 – MCB Misc. Power Circuits RL023
- PG19GFR3 – Instr. Bus Transformer Alt. Feed XPN07D

PFSSD components supplied power from PG19GCR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG19GFR3 is credited as one source of power to PN07. The redundant source of power from NG01BEF4 is unaffected by a fire in this area.

Based on the above discussion, loss of breaker PA0106 will not adversely affect PFSSD if a fire occurs in this area.

Breaker PA0207 supplies power to the following PFSSD components:

- PG20GBR217 – MCB Misc. Power Circuits RL023
- PG20GER5 – Instr. Bus Transformer Alt. Feed XPN08D

PFSSD components powered from PG20GBR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG20GER5 is credited as one source of power to PN08. The redundant source of power from NG02BBF1 is unaffected by a fire in this area.

Based on the above discussion, loss of breaker PA0207 will not adversely affect PFSSD if a fire occurs in this area.

Damage to cables 15PGA10BA and 16PGA11AC due to a fire in this area will not adversely impact the ability to achieve and maintain PFSSD due to the availability of redundant components that are unaffected by a fire in this area.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-11PK02, E-13PG10, E-13PG11, E-13RL07, E-13SC12, E-1F9421, E-1F9422C, KD-7496, DCP 13324

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1.0 GENERAL AREA DESCRIPTION

Fire area RWST is located in the yard area on the West side of the Fuel Building, South of the Hot Machine Shop and includes the rooms listed in Table RWST-1.

Table RWST-1
Rooms Located in Fire Area RWST

ROOM #	DESCRIPTION
9102	RWST Valve House
RWST	Refueling Water Storage Tank

There is no automatic fire detection or suppression in the RWST valve house. Manual fire suppression capabilities are present in the yard area adjacent to the RWST. Based on the Fire Hazards Analysis (E-1F9905), the combustible loading around the RWST is low.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table RWST-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table RWST-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RWST

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
BN	Borated Refueling Water Storage System	R, M, H	All four RWST level transmitters may be affected if a fire occurs in this area. This is acceptable as discussed in Section 5.1.1.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.

Table RWST-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RWST			
System	**System Name**	**PFSSD Function***	**Comments**
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.

Table RWST-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RWST

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.

Table RWST-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area RWST			
System	**System Name**	**PFSSD Function***	**Comments**
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area RWST.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area RWST. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Redundant Post-Fire Safe Shutdown capability exists if a severe fire occurs in this area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area RWST.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA RWST

PFSSD components (S. in E-15000) located in fire area RWST are shown in Table RWST-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table RWST-3.

Table RWST-3 PFSSD Equipment Located in Fire Area RWST				
Room #	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
9102	BNLT0930	RWST Level Transmitter	5.1.1	
9102	BNLT0931	RWST Level Transmitter	5.1.1	
9102	BNLT0932	RWST Level Transmitter	5.1.1	
9102	BNLT0933	RWST Level Transmitter	5.1.1	
RWST	TBN01	Refueling Water Storage Tank	5.1.1	

5.1.1 Refueling Water Storage Tank

This fire area contains the Refueling Water Storage Tank (RWST) and all four RWST level transmitters. Cables associated with all four level transmitters are run in this area. Loss of the RWST would adversely impact the ability to achieve and maintain PFSSD since the RWST is the only relied on source of boration and reactor makeup. Loss of all four level transmitters would result in loss of RWST level indication in the control room.

A low-low RWST level signal on two out of four level transmitters will provide a permissive for containment sump isolation valves EJHV8811A and EJHV8811B to open. If this occurs coincident with a safety injection signal (SIS), the containment sump isolation valves will open, causing the RWST to drain to the sump. A spurious SIS is not credible for a fire in area RWST. Therefore, the open permissive signal will not occur for valves EJHV8811A and EJHV8811B and the RWST will not drain to the containment sump.

Catastrophic failure of the RWST due to an exposure fire is not considered credible. Administrative controls limit the quantity of combustibles stored in the vicinity of the RWST and normal in-situ combustible loading is low, per E-1F9905. The tank is made of 304 Stainless Steel with a minimum wall thickness of 3/16” at the top and a maximim wall thickness of ½” at the bottom. The administrative controls, low combustible loading, steel tank construction together with the large heat sink provided by the water in the tank provides reasonable assurance that the RWST will remain available in the event of a fire.

A loss of RWST level indication does not impact PFSSD. The tank contains sufficient volume at minimum Tech Spec level to achieve cold shutdown conditions and loss of inventory in the RWST is not a concern.

Based on the above discussion, there is reasonable assurance that the RWST will be available if a postulated fire occurs in the RWST valve house or in the yard area around the RWST.

References: E-15000, XX-E-013, E-13BN07, E-13EJ06A, E-13EJ06B, M-12BN01, M-12EJ01, M-109-00040, M-162C-00041, M-162C-00046

5.2 PFSSD CABLE EVALUATION

Table RWST-4 lists all the PFSSD cables (S. in E-15000) located in fire area RWST. The applicable evaluation section is also listed in Table RWST-4.

Table RWST-4
PFSSD Cables Located in Fire Area RWST

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
11BNI07CA	9102	BNLT0930	I	5.1.1	RWST Level Transmitter
12BNI07DA	9102	BNLT0931	I	5.1.1	RWST Level Transmitter
13BNI07EC	9102	BNLT0932	I	5.1.1	RWST Level Transmitter
14BNI07FA	9102	BNLT0933	I	5.1.1	RWST Level Transmitter

FIRE AREAS CC-1, T-1, T-2 and TURB

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1.0 GENERAL AREA DESCRIPTION

Fire areas CC-1, T-1, T-2 and TURB consists of all rooms and elevations in the Communications Corridor and Turbine Building, except for the lube oil storage tank room (Fire Area T-4) and the lube oil reservoir room (Fire Area T-10) and include the rooms listed in Table 1. Fire Area CC-1 is the Communication Corridor. Fire Area T-1 is the South stairwell, all levels. Fire Area T-2 includes all levels of the Turbine Building up to 50 feet north of the Auxiliary Building wall. Fire Area TURB includes all remaining areas in the Turbine Building.

Table 1
Rooms Located in Fire Areas CC-1, T-1, T-2 and TURB

ROOM #	FIRE AREA	DESCRIPTION
3102	CC-1	Pipe Space, Tank & Storage Area El. 1974-0
3103	CC-1	Stair No. CC-1
3225	CC-1	Corridor No. 2 El. 1984-0
3226	CC-1	Counting Room El. 1984-0
3227	CC-1	Vestibule No. 3 El. 1984-0
3228	CC-1	Hot Laboratory El. 1984-0
N/A	CC-1	Pipe Chase – South of 3227 & 3228
3303	CC-1	Corridor El. 2000-0
3304	CC-1	General Floor Area El. 2000-0
3402	CC-1	Corridor No. 3 El. 2016-0
3502	CC-1	Lobby El. 2032-0
3503	CC-1	General Floor Area El. 3032-0
3611	CC-1	Corridor No. 2 El. 2047-6
3612	CC-1	Operations Conference Room El. 2047-6
3613	CC-1	Work Control Center El. 2047-6
3614	CC-1	Corridor No. 3 El. 2047-6
3619	CC-1	General Floor Area El. 2047-6
3701	CC-1	General Floor Area El. 2061-6
3702	CC-1	Battery Room El. 2061-6
3703	CC-1	Radio Equipment Room El. 2061-6
3704	CC-1	General Floor Area El. 2061-6
3705	CC-1	Battery Room El. 2061-6
3802	CC-1	Elevator No. 1 Machine Room El 2078-0
3803	CC-1	Corridor El. 2073-6
4101	T-1	Turbine Building South Stair
4201	TURB	Condenser Pit El. 1983-0
4203	TURB	Condensate Pump Area El. 1983-0
4204	TURB	Sec. Liquid Waste Collection Pump Area El. 1983-0
4205	TURB	High TDS & Low TDS Tank & Pump Area El. 1983-0
4301	T-2	General Floor Area El. 2000-0
4301E	TURB	General Floor Area East El. 2000-0
4301W	TURB	General Floor Area West El. 2000-0

Table 1
Rooms Located in Fire Areas CC-1, T-1, T-2 and TURB

ROOM #	FIRE AREA	DESCRIPTION
4302	T-2	Condensate Vacuum Pump Area El. 2000-0
4303	T-2	Air Compressor Area El. 2000-0
4304	T-2	Men's Toilet El. 2000-0
4305	T-2	Women's Toilet El. 2000-0
4306	T-2	Janitors Closet El. 2000-0
4309	TURB	Southwest Stairway
4310	TURB	Northwest Stairway
4312	TURB	Northeast Stairway
4313	TURB	Southeast Center Stairway
4314	TURB	Southeast Stairway
4316	TURB	Condensate Polishing Area El. 2000-0
4317	TURB	Process Sampling Lab El. 2000-0
4318	TURB	Turbine Cooling Water HX Area El. 2000-0
4319	TURB	Condensate Chemical Addition Units El. 2000-0
4320	TURB	Secondary Liquids Drain Collection Tanks El. 2000-0
4321	TURB	Railroad Bay and Laydown Area El. 2000-0
4322	T-2	Truck Bay & Laydown Area El. 2000-0
4323	TURB	Cold Chemistry Lab El. 2000-0
4324	TURB	Acid Day Tank Area El. 2000-0
4325	TURB	Caustic Day Tank Area El. 2000-0
4326	TURB	pH & O2 Control Chemical Storage Area El. 2000-0
4351	T-2	General Floor Area up to 50 Feet North of AB Wall El. 2015-4
	TURB	General Floor Area Beyond 50 Feet North of AB Wall El. 2015-4
4401	T-2	General Floor Area up to 50 Feet North of AB Wall El. 2033-0
4401N	TURB	General Floor Area North of Column T4 El. 2033-0
4401E	TURB	General Floor Area East Beyond 50 Feet North of AB Wall El. 2033-0
4401W	TURB	General Floor Area West Beyond 50 Feet North of AB Wall El. 2033-0
4402	TURB	South Battery Room El. 2033-0
4404	TURB	North Battery Room El. 2033-0
4405	TURB	Battery Charger Room El. 2033-0
4501	T-2	General Floor Area up to 50 Feet North of AB Wall El. 2065-0
4501E	TURB	General Floor Area East Beyond 50 Feet North of AB Wall El. 2065-0
4501W	TURB	General Floor Area West Beyond 50 Feet North of AB Wall El. 2065-0
4502	TURB	Women's Toilet El. 2065-0

Table 1 Rooms Located in Fire Areas CC-1, T-1, T-2 and TURB		
ROOM #	**FIRE AREA**	**DESCRIPTION**
4503	TURB	Men's Toilet El. 2065-0
4504	T-2	EHC Control Cabinet Room El. 2065-0
4505	TURB	Turbine Deck Office and Storage Area El. 2065-0
4601	TURB	Elevator Machine Room El. 2083-0

Fire area CC-1 has no automatic suppression and partial detection and is separated from the Control Building and Auxiliary Building by minimum 3-hour fire resistant construction and is open to the Turbine Building. Fire Area T-1 is protected with an automatic smoke detector at the top of the stairway. Fire Areas T-2 and TURB are protected with an automatic pre-action sprinkler system and automatic heat detection. The areas are separated from the Auxiliary Building by minimum 3-hour fire resistant construction and are open to the Communication Corridor.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table 2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the area analysis results, see Section 8.0 of the Fire Area Analysis Narrative section.

Table 2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Areas CC-1, T-1, T-2 and TURB

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	A number of valves located downstream of the main steam isolation valves could be affected. The main steam isolation valves (MSIVs) and MSIV bypass valves are unaffected.
AC	Main Turbine	R, H	All four main turbine stop valves and associated cables and components are located in this area. Damage to this equipment will not adversely impact PFSSD since the MSIVs can be closed from the control room.
AE	Main Feedwater	H, P	Main feedwater pumps, valves and associated cables and components are located in this area. The main feedwater isolation valves are unaffected by a fire in this area and can be closed from the control room to isolate main feedwater flow.
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
BB	Reactor Coolant System	R, M, H, P, S	All four reactor coolant pumps could shut down or be prevented from shutting down from the main control room due to damage to the power and control cables. This will not adversely impact PFSSD since natural circulation cooldown can be used if the pumps stop. If the pumps remain on, forced circulation can continue. RCP seal injection is unaffected so continuously operating RCP will not result in a seal LOCA.
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
BM	Steam Generator Blowdown System	R, M, H	The 125 VDC power supply to Steam Generator Blowdown Control Panel BM157 in the Radwaste Control Room could be affected. This would result in loss of power which would fail the blowdown valves closed, which is the desired position. The main control room hand switches associated with the blowdown valves are unaffected.
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.

Table 2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Areas CC-1, T-1, T-2 and TURB

System	System Name	PFSSD Function*	Comments
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
EM	High Pressure Coolant Injection	R, M	Power to EMHV8882 could be lost. This valve fails closed on loss of power which is the desired PFSSD position.
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
FB	Auxiliary Steam	R, H	Valves FBHV0080 and FBHV0081 and associated cables could be affected. This will not prevent PFSSD since the MSIVs can be isolated from the control room.
FC	Auxiliary Turbines	R, H, P	A number of cables and components associated with this system are located in this area. These cables and components are associated with MSIV downstream components. Damage to these cables and components will not adversely impact PFSSD since the MSIVs are unaffected.
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
GK	Control Room and Class 1E Switchgear Room Coolers	S	A fire in this area could cause both Class 1E Electrical Equipment Room A/C units (SGK05A and SGK05B) to shut down due to a spurious fire isolation signal or loss of power to the fire isolation relay. The units can be started using bypass hand switches GKHS0101 (SGK05A) and GKHS0104 (GKHS0104) on panel RP068 in the main control room.
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.

Table 2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Areas CC-1, T-1, T-2 and TURB

System	System Name	PFSSD Function*	Comments
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
KH	Service Gas	S	Hydrogen valve KHV0096 is located in this area. Damage to this valve will not adversely impact PFSSD since the valve is not credited for a fire in this area.
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
MA	Main Generation	S	Transformer protection cabinets MA104D, MA104E and MA104F and Site Intreface Panel MA152A could be affected, causing a loss of off-site power on NB01 and NB02. This will not adversely impact PFSSD since on-site power is available from emergency diesel generators A and B.
MR	Startup Transformer	S	Startup transformer protection cabinets and associated cables are located in this area. This will not adversely impact PFSSD since on-site power is available from emergency diesel generators A and B.
NB	4.16 kV System	S	Off-site power to NB01 and NB02 could be affected. On-site power to NB01 and NB02 is unaffected.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
PA	13.8kV	S	The PA buses are located in this area. Consequently, they could be affected. This will not affect PFSSD since on-site power remains available to NB02 and other loads fed from the PA bus are not required for PFSSD in the event of a fire in this area.

Table 2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Areas CC-1, T-1, T-2 and TURB

System	System Name	PFSSD Function*	Comments
PB	4.16kV	H, S	Bus PB04 control power could be affected. The PFSSD function of PB04 is to ensure the motor driven feedwater pump can be stopped or prevented from starting to prevent steam generator overfill. As stated in the AE system comments, the main feedwater isolation valves are unaffected and can be closed from the control room.
PG	480V Load Centers and MCCs	S	A number of cables and components associated with non-safety related 480 VAC load centers and MCCs are located in this area. None of these components are required for PFSSD in the event of a fire in this area.
PK	125VDC	S	Several cables and components associated with non-safety related 125 VDC system are located in this area. Redundant PFSSD capability is available.
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
RL	Control Room MCB	S	120 VAC non-class 1E power to RL023 could be affected. This would affect components located downstream of the MSIVs. The MSIVs are unaffected by a fire in this area. 125 VDC non-class 1E power to RL001/RL002 could be affected. This would affect the letdown isolation valves and letdown orifice isolation valves. Loss of power will fail the valves closed which is the desired PFSSD position. 125 VDC non-class 1E power to RL013/RL014 could be affected. This would affect off-site power to NB01 and NB02. On-site power to NB01 and NB02 remains available. 125 VDC non-class 1E power to RL017/RL018 could be affected. This would affect valve EMHV8882 which fails closed on loss of power, which is the desired PFSSD position.
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.

Table 2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Areas CC-1, T-1, T-2 and TURB

System	System Name	PFSSD Function*	Comments
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in areas CC-1, T-1, T-2 and TURB.
SY	Switchyard	S	A control cable associated with switchyard breaker 13-48 is run in this area. Damage to this cable could cause the breaker to open which would affect off-site power to NB01. On-site power to NB01 remains available.
UU	Supervisory System	S	A control cable associated with switchyard breaker 13-8 is run in this area. Damage to this cable could cause the breaker to open which would affect off-site power to NB01. On-site power to NB01 remains available.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in fire areas CC-1, T-1, T-2 and TURB. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

3.2.1 SGK05A and SGK05B

SGK05A and SGK05B could shut down or fail to start due to a spurious fire isolation signal or loss of power to the fire isolation relay. SGK05A can be re-started by placing GKHS0101 on panel RP068 in bypass position and SGK05B can be re-started by placing GKHS0104 on panel RP068 in bypass position.

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post Fire Safe Shutdown is assured if a fire occurs in fire areas CC-1, T-1, T-2 and TURB.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in areas CC-1, T-1, T-2 and TURB.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREAS CC-1, T-1, T-2 AND TURB

PFSSD components (S. in E-15000) located in fire areas CC-1, T-1, T-2 and TURB are shown in Table 3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table 3.

Table 3
PFSSD Equipment Located in Fire Areas CC-1, T-1, T-2 and TURB

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
3303	KC222	Halon Fire Protection Panel	5.1.1	
3619	KC275A	Fire Detection Panel	5.1.1	
3704	PK04	125 VDC Non-Class 1E Bus	5.1.7	
3704	PK0401	125 VDC Non-Class 1E Line from/to PK14	5.1.7	
3704	PK0402	125 VDC Non-Class 1E from Battery Charger PK24	5.1.7	
3704	PK0407	125 VDC Non-Class 1E to PN04	5.1.7	
3704	PK24	125 VDC Non-Class 1E Battery Charger	5.1.7	
3705	PK14 (EAST)	125 VDC Non-Class 1E Battery	5.1.7	
3705	PK14 (WEST)	125 VDC Non-Class 1E Battery	5.1.7	
4301W	ABLSH0050	Main Steam Line/Hi Press Trap Hdr Level Sw	5.1.4	
4301W	ABLSH0051	Main Steam Line/Hi Press Trap Hdr Level Sw	5.1.4	
4301W	ABLSH0052	Main Steam Line/Hi Press Trap Hdr Level Sw	5.1.4	
4301W	ABLSH0053	Main Steam Line/Hi Press Trap Hdr Level Sw	5.1.4	
4301W	ABLV0050	Main Steam Header to Steam Dumps Trap Bypass Vlv	5.1.4	
4301W	ABLV0051	Main Steam Header to Steam Dumps Trap Bypass Vlv	5.1.4	
4301W	ABLV0052	Main Steam Header to Steam Dumps Trap Bypass Vlv	5.1.4	
4301W	ABLV0053	Main Steam Header to Steam Dumps Trap Bypass Vlv	5.1.4	
4301W	ABLY0050	ABLV0050 Solenoid Valve	5.1.4	
4301W	ABLY0051	ABLV0051 Solenoid Valve	5.1.4	
4301W	ABLY0052	ABLV0052 Solenoid Valve	5.1.4	
4301W	ABLY0053	ABLV0053 Solenoid Valve	5.1.4	
4301W	ABZS0050	ABLV0050 Limit Switch	5.1.4	
4301W	ABZS0051	ABLV0051 Limit Switch	5.1.4	
4301W	ABZS0052	ABLV0052 Limit Switch	5.1.4	

Table 3
PFSSD Equipment Located in Fire Areas CC-1, T-1, T-2 and TURB

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
4301W	ABZS0053	ABLV0053 Limit Switch	5.1.4	
4301W	FC169A	Termination Cabinet For SGFP A Controller	5.1.4	
4301W	FC169C	SGFP A Extended I/O Cabinet	5.1.4	
4301W	FC170A	Termination Cabinet For SGFP B Controller	5.1.4	
4301W	FC170C	SGFP B Extended I/O Cabinet	5.1.4	
4301W	FCFV0005	MFP Turbine A High Pressure Stop Valve	5.1.4	
4301W	FCFV0105	MFP Turbine B High Pressure Stop Valve	5.1.4	
4301W	FCHV0003	SGFWP Turb A Main Steamline Low Pt Drain HIS	5.1.4	
4301W	FCHV0103	SGFWP Turb B Main Steamline Low Pt Drain HIS	5.1.4	
4301W	FCHY0003	SGFWP A Main Steamline Low Pt Drain Solenoid	5.1.4	
4301W	FCHY0103	SGFWP B Main Steamline Low Pt Drain Solenoid	5.1.4	
4301W	FCLSH0003	SGFWP Turb A Main Steamline Low Pt Drain LSH	5.1.4	
4301W	FCLSH0103	SGFWP Turb B Main Steamline Low Pt Drain LSH	5.1.4	
4322	TB42401	Off-site Power Breaker 13-48	5.1.5	Interposing Terminal Box for cables 15SY135 & 15SY134.
4351	ABFV0023	Steam Trap Bypass Valve - Loop 4	5.1.4	
4351	ABFV0025	Steam Trap Bypass Valve - Loop 1	5.1.4	
4351	ABFV0027	Steam Trap Bypass Valve - Loop 2	5.1.4	
4351	ABFV0029	Steam Trap Bypass Valve - Loop 3	5.1.4	
4351	ABFY0023	ABFV0023 Solenoid Valve	5.1.4	
4351	ABFY0025	ABFV0025 Solenoid Valve	5.1.4	
4351	ABFY0027	ABFV0027 Solenoid Valve	5.1.4	
4351	ABFY0029	ABFV0029 Solenoid Valve	5.1.4	
4351	ABHV0046	Main Steam to Steam Seal System Iso Vlv	5.1.4	

Table 3
PFSSD Equipment Located in Fire Areas CC-1, T-1, T-2 and TURB

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
4351	ABZS0023	Steam Trap Bypass Valve Loop 4 Limit Sw	5.1.4	
4351	ABZS0025	Steam Trap Bypass Valve Loop 1 Limit Sw	5.1.4	
4351	ABZS0027	Steam Trap Bypass Valve Loop 2 Limit Sw	5.1.4	
4351	ABZS0029	Steam Trap Bypass Valve Loop 3 Limit Sw	5.1.4	
4351	PG11	480 VAC Non-Class 1E Load Center	5.1.6	
4351	PG1100	480 VAC Non-Class 1E LC Feeder from PG1300	5.1.6	
4351	PG1101	480 VAC Non-Class 1E LC Incoming Feeder	5.1.6	
4351	PG1106	480 VAC Non-Class 1E Turbine Bldg MCC PG11J	5.1.6	
4351	PG1107	480 VAC Non-Class 1E Turbine Bldg MCC PG11K	5.1.6	
4351	PG11J	480 VAC Non-Class 1E Turbine Bldg MCC	5.1.6	
4351	PG11JFF1	Incoming Line from LC PG11	5.1.6	
4351	PG11JFR2	Main Steam Supply to MSR A & C 2nd Stage Iso Vlv ABHV0031	5.1.6	
4351	PG12	480 VAC Non-Class 1E Load Center	5.1.6	
4351	PG1200	480 VAC Non-Class 1E LC Feeder from PG1600	5.1.6	
4351	PG1201	480 VAC Non-Class 1E LC Incoming Feeder	5.1.6	
4351	PG1207	480 VAC Non-Class 1E Turbine Bldg MCC PG12K	5.1.6	
4351	XPG11	480 VAC Non-Class 1E LC Transformer - Turbine Bldg	5.1.6	
4351	XPG12	480 VAC Non-Class 1E LC Transformer - Turbine Bldg	5.1.6	
4401	ACFCV0043	Main Stop Valve 1	5.1.4	
4401	ACFCV0044	Main Stop Valve 2	5.1.4	
4401	ACFCV0045	Main Stop Valve 3	5.1.4	
4401	ACFCV0046	Main Stop Valve 4	5.1.4	

Table 3
PFSSD Equipment Located in Fire Areas CC-1, T-1, T-2 and TURB

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
4401	KHV0096	Hydrogen to VCT and Generator System Iso Vlv	5.1.3	
4401	PG11K	480 VAC Non-Class 1E Turbine Bldg MCC	5.1.6	
4401	PG11KAF5	Incoming Line from LC PG11	5.1.6	
4401	PG11KBR3	Main Steam/Extraction Steam Xconnect Iso (FBHV0081)	5.1.6	
4401	RP141	Auxiliary Relay Rack	5.1.4	
4401W	ABHV0032	Main Steam Supply to MSR B&D 2nd Stage Iso Valve	5.1.4	
4401W	ABUV0034	Cooldown Condenser Dump Valve	5.1.4	
4401W	ABUV0035	Cooldown Condenser Dump Valve	5.1.4	
4401W	ABUV0036	Cooldown Condenser Dump Valve	5.1.4	
4401W	ABUV0037	Cooldown Condenser Dump Valve	5.1.4	
4401W	ABUV0038	Cooldown Condenser Dump Valve	5.1.4	
4401W	ABUV0039	Cooldown Condenser Dump Valve	5.1.4	
4401W	ABUV0040	Cooldown Condenser Dump Valve	5.1.4	
4401W	ABUV0041	Cooldown Condenser Dump Valve	5.1.4	
4401W	ABUV0042	Cooldown Condenser Dump Valve	5.1.4	
4401W	ABUV0043	Cooldown Condenser Dump Valve	5.1.4	
4401W	ABUV0044	Cooldown Condenser Dump Valve	5.1.4	
4401W	ABUV0045	Cooldown Condenser Dump Valve	5.1.4	
4401W	ABUY0034B	ABUV0034 Solenoid Valve	5.1.4	
4401W	ABUY0035B	ABUV0035 Solenoid Valve	5.1.4	
4401W	ABUY0036B	ABUV0036 Solenoid Valve	5.1.4	
4401W	ABUY0037B	ABUV0037 Solenoid Valve	5.1.4	
4401W	ABUY0038B	ABUV0038 Solenoid Valve	5.1.4	

Table 3
PFSSD Equipment Located in Fire Areas CC-1, T-1, T-2 and TURB

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
4401W	ABUY0039B	ABUV0039 Solenoid Valve	5.1.4	
4401W	ABUY0040B	ABUV0040 Solenoid Valve	5.1.4	
4401W	ABUY0041B	ABUV0041 Solenoid Valve	5.1.4	
4401W	ABUY0042B	ABUV0042 Solenoid Valve	5.1.4	
4401W	ABUY0043B	ABUV0043 Solenoid Valve	5.1.4	
4401W	ABUY0044B	ABUV0044 Solenoid Valve	5.1.4	
4401W	ABUY0045B	ABUV0045 Solenoid Valve	5.1.4	
4401W	MA104D	Transformer Protection Relay Panel	5.1.5	
4401W	MA104E	Transformer Protection Relay Panel	5.1.5	
4401W	MA104F	Transformer Protection Relay Panel	5.1.5	
4401W	MA152A	Site Interface Relay Panel	5.1.5	
4401W	PA01	13.8 kV Non-Class 1E Switchgear Bus	5.1.6	
4401W	PA0102	18.5 MVA Fdr (125 VDC Ctrl Pwr for PA0103 to PA0109)	5.1.6	
4401W	PA0105	13.8 kV Non-Class 1E Load Center Feeder	5.1.6	
4401W	PA0106	13.8 kV Non-Class 1E Load Center Feeder	5.1.6	
4401W	PA0107	Reactor Coolant Pump A Motor (DPBB01A)	5.1.6	
4401W	PA0108	Reactor Coolant Pump B Motor (DPBB01B)	5.1.6	
4401W	PA02	13.8 kV Non-Class 1E Switchgear Bus	5.1.6	
4401W	PA0201	13.8 kV Non-Class 1E Site Feeder (XNB02)	5.1.6	
4401W	PA0204	Reactor Coolant Pump D Motor (DPBB01D)	5.1.6	
4401W	PA0205	Reactor Coolant Pump C Motor (DPBB01C)	5.1.6	
4401W	PA0206	13.8 kV Non-Class 1E Load Center Feeder	5.1.6	
4401W	PA0207	13.8 kV Non-Class 1E Load Center Feeder	5.1.6	

Table 3
PFSSD Equipment Located in Fire Areas CC-1, T-1, T-2 and TURB

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
4401W	PA0210	18.5 MVA Fdr (125 VDC Ctrl Pwr for PA0201 to PA0209)	5.1.6	
4401W	PB04	4.16KV Non-Class 1E Switchgear Bus	5.1.7	
4401W	PB0406	Motor Driven Feedwater Pump (DPAE02)	5.1.7	
4401W	PB0406HIS	Motor Driven Feedwater Pump (DPAE02) HIS	5.1.7	
4401W	PG12K	480 VAC Non-Class 1E Turbine Bldg MCC	5.1.6	
4401W	PG12KAF4	Main Steam Supply to 2nd Stage Reheat (ABHV0032)	5.1.6	
4401W	PG12KAF5	Main Steam to Steam Seal Iso Valve (ABHV0046)	5.1.6	
4401W	PG12KAF6	480 VAC Non-Class 1E Load Center Incoming Feeder	5.1.6	
4401W	PG12KEF3	Main Steam Iso to Aux Steam Reboiler (FBHV0080)	5.1.6	
4401W	PG1300	480 VAC Non-Class 1E LC Feeder from PA0105	5.1.6	
4401W	PG1400	480 VAC Non-Class 1E LC Feeder from PA0207	5.1.6	
4401W	PG1500	480 VAC Non-Class 1E LC Feeder from PA0106	5.1.6	
4401W	PG1600	480V Non-Class 1E LC Feeder from PA0206	5.1.6	
4404	PK11	125 VDC Non-Class 1E Battery	5.1.7	
4404	PK12 (EAST)	125 VDC Non-Class 1E Battery	5.1.7	
4404	PK12 (WEST)	125 VDC Non-Class 1E Battery	5.1.7	
4405	PK01	125 VDC Non-Class 1E Bus	5.1.7	
4405	PK0101	125 VDC Non-Class 1E Line from/to PK11	5.1.7	
4405	PK0102	125 VDC Non-Class 1E Line from Battery Charger PK21	5.1.7	
4405	PK0104	125 VDC Non-Class 1E Distribution Swbd	5.1.7	
4405	PK0105	125 VDC Non-Class 1E to PN03	5.1.7	
4405	PK0106	125VDC Non-Class 1E Distr Swbd (PK61)	5.1.7	
4405	PK0112	125VDC Non-Class 1E Distr Swbd (PK51)	5.1.7	

Table 3
PFSSD Equipment Located in Fire Areas CC-1, T-1, T-2 and TURB

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
4405	PK02	125VDC Non-Class 1E Bus	5.1.7	
4405	PK0201	125VDC Non-Class 1E Line from/to PK12	5.1.7	
4405	PK0202	125VDC Non-Class 1E from Battery Chgr PK22	5.1.7	
4405	PK0206	125VDC Non-Class 1E Distr Swbd (PK62)	5.1.7	
4405	PK0211	125VDC Non-Class 1E Distr Swbd (PK52)	5.1.7	
4405	PK21	125VDC Non-Class 1E Battery Charger	5.1.7	
4405	PK22	125VDC Non-Class 1E Battery Charger	5.1.7	
4405	PK41	125VDC Non-Class 1E Distribution Switchboard	5.1.7	
4405	PK4100	125VDC Non-Class 1E Distr Swbd Incoming Fdr	5.1.7	
4405	PK4103	PA01 Breaker Control Power (Outgoing Brkrs)	5.1.7	
4405	PK4114	Main Turbine Stop Valves Manual Trip (AC119D)	5.1.4 5.1.7	
4405	PK62	125 VDC Non-Class 1E Distribution Swbd	5.1.7	
4405	PK6200	125 VDC Non-Class 1E Distribution Swbd Incoming Fdr	5.1.7	
4405	PK6204	PA02 Breaker Control Power	5.1.7	
4405	PK6205	PB04 Breaker Control Power	5.1.7	
4405	PK6216	Transformer Protection Relay Panel (MA104D)	5.1.7	
4501	ABHV0031	Main Steam Supply to MSR A&C 2nd Stage Iso Valve	5.1.4	
4501E	TVAC01	Main Turbine	5.1.4	
4501W	FBHV0080	Main Steam Iso to Auxiliary Steam Reboiler	5.1.4	
4501W	FBHV0081	Main Steam/Extraction to Aux Reboiler HS	5.1.4	
4504	AC119D	Electrohydraulic Control Cabinet	5.1.4	

5.1.1 Class 1E Electrical Equipment Room A/C Units

Class 1E electrical equipment room cooling is required for PFSSD to maintain the room temperature within operable limits for the equipment. Room cooling for the credited train of PFSSD equipment is required.

Cables 15GKK31CA and 15GKK31CB are associated with the fire isolation signal on SGK05A. Cables 16GKK31DA and 16GKK31DB are associated with the fire isolation signal on SGK05B. An open circuit within these cables will cause the associated unit to shut down. A short circuit within these cables will prevent the associated unit from shutting down in the event of a fire isolation signal. The fire isolation signal on SGK05A is initiated when a fire occurs in the Train A ESF switchgear room or the Train A switchboard rooms to prevent dilution of Halon fire extinguishing agent in the rooms. The fire isolation signal on SGK05B is initiated when a fire occurs in the Train B ESF switchgear room or the Train B switchboard rooms to prevent dilution of Halon fire extinguishing agent in the rooms. A fire in the turbine building or communication corridor does not require shutdown of SGK05A or SGK05B and, therefore, a hot short that prevents shutdown will have no adverse impact on PFSSD.

Smoke detectors installed in the Train A and Train B ESF switchgear rooms and the Train A and Train B switchboard rooms are wired to fire protection panel KC275A, which is located in the communication corridor room 3619. Smoke detection signals are processed in KC275A and, upon receipt of the proper signals for the room, a normally open contact in KC275A closes and initiates a release of Halon into the room and shuts down the associated air conditioning unit. Cables 16KCQ13SA, 16KCQ21DA, 16KCQ21EA, 16KCQ21FA, 16KCQ21HA and 16KCQ21JA carry the short circuit signal from fire protection panel KC275A to the respective Halon releasing panel (KC222 for ESF switchgear rooms and KC230 for the switchboard rooms). An open circuit in these cables due to a fire will prevent Halon release to the associated room. However, since the postulated fire is in the turbine building and communication corridor, this will have no adverse impact on PFSSD. A short circuit in these cables will cause a Halon release and will shut down SGK05A and or SGK05B.

If SGK05A is required for PFSSD, the fire isolation signal can be bypassed in the control room by placing hand switch GKHS0101 in Bypass position. This will bypass the fire isolation signal and allow the unit to operate. GKHS0101 is located on panel RP068.

If SGK05B is required for PFSSD, the fire isolation signal can be bypassed in the control room by placing hand switch GKHS0101 in Bypass position. This will bypass the fire isolation signal and allow the unit to operate. GKHS0104 is located on panel RP068.

Based on the above discussion, a fire in this area could cause one or both Class 1E electrical equipment room A/C units to shut down but the units can be re-started from the control room. Therefore, Class 1E electrical equipment room air conditioning is available if a fire occurs in this area.

References: XX-E-013, E-15000, E-13GK13, E-13GK13A, E-13GK31, E-1F9444, M-658-00036, M-658-00038, M-658-00039, M-658-00040, M-658-00042, M-658-00043

5.1.2 Deleted

5.1.3 Hydrogen Supply to VCT and Generator System Isolation Valve

Valve KHV0096 is included in the PFSSD analysis to provide a method to de-pressurize the VCT if a fire occurs in fire area A-8. This action may be necessary to prevent hydrogen gas intrusion into the charging pump suction if the VCT outlet valves do not close and makeup to the VCT is isolated.

A fire in this area will not prevent isolating the VCT outlet valves. Therefore, access to this valve would not be required.

References: XX-E-013, E-15000, M-12BG03, M-12KH02

5.1.4 Main Steam Isolation Valve Downstream Components

PFSSD requires isolation of main steam flow to prevent uncontrolled cooldown and potential return to criticality. There are two methods credited in the PFSSD analysis to isolate main steam. These methods include either isolation of the main steam isolation valves (MSIVs) and MSIV bypass valves or isolation of valves located downstream of the MSIVs.

Cables and components associated with a number of MSIV downstream valves are located in this area. Damage to these cables and components could prevent isolation of the downstream valves. Cables associated with all four MSIVs and bypass valves are unaffected. Therefore, in the event of a fire in this area, main steam flow can be isolated using all close hand switches ABHS0079 or ABHS0080 in the main control room.

Based on the above discussion, damage to cables associated with MSIV downstream components will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-13AB02A, E-13AB02B, E-13AB04, E-13AB08, E-13AB11A, E-13AB11B, E-13AB11C, E-13AB18, E-13AB22, E-13AC07, E-13AC15, E-13AC16, E-13FB12, E-13FC08A, E-13FC29A, E-13FC29B, E-13FC35, E-1F9103, M-12AB03, M-12FB01

5.1.5 4.16 kV Class 1E Power

At least one source of 4.16 kV Class 1E power is required to be available to energize required PFSSD equipment. The PFSSD methodology uses Class 1E power from either the off-site or on-site sources.

On-site power originates from the respective train emergency diesel generator. Train A off-site power originates from the switchyard and supplies transformer XNB01 which feeds bus NB01. Train B off-site power originates from the switchyard and supplies startup transformer XMR01 which supplies power to bus PA02. Bus PA02 supplies power to ESF transformer XNB02, through breaker PA0201, which supplies bus NB02.

Transformer protection relay panels MA104D, MA104E and MA104F are located in room 4401W. Relay panels MA104D and MA104E contain relays 286/T1 and 486/T1 associated with startup transformer XMR01 and XNB02 feeder breaker PA0201. Damage to these panels could cause a loss of off-site power from XMR01 and therefore a loss of off-site power to NB02. Relay panel MA104F contains multiple relays associated with off-site power feed to XNB01. Site interface panel MA152A contains circuits associated with off-site power feed to XNB01. Damage to these panels and associated circuits could cause a loss of power to NB01.

A number of off-site power related cables associated with Train A and B are run in this area. Damage to these cables could prevent off-site power feed to NB01 and NB02. Based on Calculation XX-E-013, Appendix 2, off-site power can be lost to both safety-related buses NB01 and NB02. Both trains of emergency diesel generators are available.

Based on the above discussion, off-site power to NB01 and NB02 could be lost if a fire occurs in this area. The Train A and Train B emergency diesel generators remain available to energize NB01 and NB02.

References: XX-E-013, E-15000, E-13MR10, E-13NB03, E-13NB05, E-13NB06, E-13NB10, E-13NB11, E-13PG01, E-1F9423, KD-7496

5.1.6 13.8 and 4.16 kV Non-Class 1E Power

Non-class 1E power is credited to supply certain non-safety related PFSSD equipment.

13.8 kV bus PA01 is credited to supply breakers PA0105, PA0106, PA0107 and PA0108. The impact on loss of these breakers is described below.

Breaker PA0105 supplies power to the following PFSSD components via PG11:

- PG11JFR2 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0031
- PG11KBR3 – Auxiliary Steam System Control Valve FBHV0081

Loss of power to these components will not adversely impact PFSSD. These components are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Breaker PA0106 supplies power to the following PFSSD components via PG19:

- PG19GCR217 – MCB Misc. Power Circuits RL023
- PG19GFR3 – Instr. Bus Transformer Alt. Feed XPN07D

PFSSD components supplied power from PG19GCR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG19GFR3 is credited as one source of power to PN07. The redundant source of power is unaffected by a fire in this area.

Breaker PA0107 supplies power to the following PFSSD component:

- Reactor Coolant Pump A Motor DPBB01A

Loss of power to the reactor coolant pump motor will have no adverse impact on PFSSD. If the RCP trips, cooldown can be achieved using natural circulation.

Breaker PA0108 supplies power to the following PFSSD component:

- Reactor Coolant Pump B Motor DPBB01B

Loss of power to the reactor coolant pump motor will have no adverse impact on PFSSD. If the RCP trips, cooldown can be achieved using natural circulation.

13.8 kV bus PA02 is credited to supply breakers PA0204, PA0205, PA0206 and PA0207. The impact on loss of these breakers is described below.

Breaker PA0206 supplies power to the following PFSSD components via PG12:

- PG12KAF4 – Main Steam Supply to 2nd Stage Reheat Valve ABHV0032
- PG12KAF5 – Main Steam Supply to Steam Seals Valve ABHV0046
- PG12KEF3 – Auxiliary Steam System Control Valve FBHV0080

Loss of power to these components will not adversely impact PFSSD. These components are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

Breaker PA0207 supplies power to the following PFSSD components via PG20:

- PG20GBR217 – MCB Misc. Power Circuits RL023
- PG20GER5 – Instr. Bus Transformer Alt. Feed XPN08D

PFSSD components supplied power from PG20GBR217 are associated with MSIV downstream components. The MSIVs are unaffected by a fire in this area and can be closed from the control room. Therefore, the MSIV downstream components are not required if a fire occurs in this area.

PG20GER5 is credited as one source of power to PN08. The redundant source of power is unaffected by a fire in this area.

Breaker PA0204 supplies power to the following PFSSD component:

- Reactor Coolant Pump D Motor DPBB01D

Loss of power to the reactor coolant pump motor will have no adverse impact on PFSSD. If the RCP trips, cooldown can be achieved using natural circulation.

Breaker PA0205 supplies power to the following PFSSD component:

- Reactor Coolant Pump C Motor DPBB01C

Loss of power to the reactor coolant pump motor will have no adverse impact on PFSSD. If the RCP trips, cooldown can be achieved using natural circulation.

Based on the above discussion, loss of 13.8 and 4.16 kV non-class 1E power will have no adverse impact on PFSSD.

References: XX-E-013, E-15000, E-11PG20, E-11PG21, E-11PK01, E-13BG10, E-13PA14, E-13PG01, E-13PG02, E-13PG03, E-13PG04, E-13PG10, E-13PG11, E-13PG13, E-13RL02, E-13RL07, E-1F9103, E-1F9421, E-1F9424E, KD-7496, M-761-02169, DCP 13324

5.1.7 125 VDC Non-Class 1E Power

Non-Class 1E 125 VDC power is required to energize certain PFSSD components. A fire in this area could result in a loss of non-Class 1E 125 VDC power to PK01, PK02 and PK04. The effects of a loss of power to these buses is discussed below.

The PFSSD components supplied by PK01 are as follows:

- PK0105 - 10 kVA Inverter and Bypass Transformer (PN03)
- PK4103 – PA01 Breaker Control Power (Outgoing Breakers)
- PK4114 – Main Turbine Stop Valves Manual Trip (AC119D)
- PK5113 – Master Supervisory Station (RP060)
- PK5117 – RC & Support Systems Control Panel (RL001 & RL002)
- PK5123 – Steam Generator Blowdown Control Panel (BM157)
- PK5126 – Auxiliary Relay Rack (RP330)
- PK5129 – Auxiliary Relay Rack (RP211)
- PK6106 – Transformer Protection Relay Panel (MA104E)
- PK6108 – Transformer Protection Relay Panel (MA104F)
- PK6115 – Site Related Control Panel (RL013 & RL014)
- PK6116 – ESF Control Panel (RL017 & RL018)

PK0105 supplies 125 VDC power to inverter PN03, which powers 120 VAC distribution panel PN310. PN310 supplies redundant power to NSSS cabinets RP043 and RP047. Redundant 480 VAC power to inverter PN03 is from PG19GCF3. PN03 and PG19GCF3 are located in fire area A-27 and are not affected by a fire in this area. Therefore, power to PN310 is available if a fire occurs in this area.

Switch PK4103 supplies control power to breakers in PA01. Loss of PA01 breaker control power will prevent operation of PA01 breakers. This would also disable the breaker protection features and prevent the breakers from tripping in the event of a fault. If this occurs, PFSSD is assured because on-site power remains available. In addition, if PA01 breaker control power is lost, RCPs A and B may not trip. This will not adversely impact PFSSD since RCP seal cooling remains available.

Switch PK4114 supplies power to cabinet AC119D. For PFSSD, AC119D is credited for closing the main turbine stop valves in the event the MSIVs cannot be closed. A fire in this area will not affect the MSIVs so damage to this switch will not affect PFSSD.

Switch PK5113 is required to ensure NB01 and NB02 can be de-energized in the event of a fire in areas C-9 and C-10. Loss of PK5113 due to a fire in this area will have no adverse impact on PFSSD.

Switch PK5117 supplies power to several non-safety components on panel RL001/RL002. Some of these components are credited for PFSSD. Those components are BGLCV0459, BGLCV0460, BGHV8149A, BGHV8149B and BGHV8149C. Valves BGLCV0459 and BGLCV0460 are letdown isolation valves. Either valve is required to be closed for PFSSD. Loss of power to PK5117 will de-energize the associated control solenoid and fail the valves closed, which is the desired PFSSD position. Valves BGHV8149A, BGHV8149B and BGHV8149C are letdown orifice isolation valves. Loss of power to PK5117 will de-energize the associated control solenoid and fail the valves closed, which is the desired PFSSD position.

Switch PK5123 supplies power to steam generator blowdown control panel BM157 located in the Radwaste control room. The steam generator blowdown panel (BM157) is used as an alternate means for isolating steam generator blowdown. The normal means uses hand switches located on RL024 in the main control room. Loss of power to BM157 will de-energize solenoid valves associated with BMHV0001, BMHV0002, BMHV0003 and BMHV0004 and will fail the valves closed, which is the desired PFSSD position.

Switch PK5126 supplies power to relay 95XGK07 in relay rack RP330, as well as other non-PFSSD relays. Relay 95XGK07 is the automatic fire signal isolation relay for SGK05A. This

relay is normally energized and, upon loss of power, SGK05A will shut down. If desired, SGK05A can be re-started by placing GKHS0101 on panel RP068 in bypass position.

Switch PK5129 supplies power to auxiliary relay rack RP211. The only PFSSD relay within RP211 is 3XBM46, which is the blowdown and sample process isolation signal relay. This relay is normally de-energized, so loss of power to this relay will not affect PFSSD.

Switch PK6106 supplies power to relay panel MA104E which is associated with NB02 off-site power supply. Switch PK6108 supplies power to relay panel MA104F which is associated with NB01 off-site power supply. Switch PK6115 is associated with Site Related Control Panel (RL013 & RL014) which is associated with NB01 and NB02 off-site power. Loss of off-site power is discussed in Section 5.1.5.

Switch PK6116 supplies power to PFSSD component EMHV8882. Valve EMHV8882 fails closed on loss of power which is the desired PFSSD position.

The PFSSD components supplied by PK02 are as follows:

- PK5213 – Reverse Isolation Relay Rack (RP331)
- PK6204 – PA02 Breaker Control Power
- PK6205 – PB04 Breaker Control Power
- PK6216 – Transformer Protection Relay Panel (MA104D)

Switch PK5213 supplies power to reverse isolation relay rack RP331. This relay rack houses two relays (3XEG08 and 95XGK08) used for PFSSD. Relay 3XEG08 is the CCW heat exchanger B temperature valve (EGTV0030) auxiliary relay. Power to this relay originates from RL019/RL020 and is unaffected by a fire in this area. Relay 95XGK08 is the automatic fire signal isolation relay for SGK05B. This relay is normally energized and, upon loss of power, SGK05B will shut down. If desired, SGK05B can be re-started by placing GKHS0104 on panel RP068 in bypass position. Therefore, loss of 125 VDC power to PK5213 will not affect PFSSD.

Switch PK6204 supplies control power to breakers in PA02. Loss of PA02 breaker control power will prevent operation of PA02 breakers. This would also disable the breaker protection features and prevent the breakers from tripping in the event of a fault. If this occurs, PFSSD is assured because on-site power remains available. In addition, if PA02 breaker control power is lost, RCPs C and D may not trip. This will not adversely impact PFSSD since RCP seal cooling remains available.

Switch PK6205 supplies control power to breakers in PB04. Loss of PB04 breaker control power will prevent operation of PB0402 from the control room, which is the feeder breaker to motor driven feedwater pump motor DPAE02. The motor driven feedwater pump is required to be stopped (or prevented from starting) to prevent overfill of the steam generators. Loss of breaker control power after the pump spuriously starts would prevent the pump from being stopped from the control room. A spurious start of the pump is possible since control circuits for the pump are run in this area. The main feedwater isolation valves (MFIVs) are unaffected by a fire in this area. Therefore, feedwater flow can be prevented by closing the MFIVs from the control room. A loss of PB04 breaker control power would also disable the breaker protection features and prevent the breakers from tripping in the event of a fault. If this occurs, PFSSD is assured because on-site power remains available. Based on the above discussion, loss of 125 VDC power from PK6205 will not affect PFSSD.

Switch PK6216 supplies power to relay panel MA104D which is associated with NB02 off-site power supply. Loss of off-site power is discussed in Section 5.1.5.

The PFSSD components supplied by PK04 are as follows:

- PK0407 – 10 kVA Inverter and Bypass Transformer (PN04)

PK0407 supplies 125 VDC power to inverter PN04, which powers 120 VAC distribution panel PN410. PN410 supplies power to NSSS cabinets RP043 and RP047. 125 VDC bus PK04 is powered from battery charger PK24 which is powered from Class 1E 480 VAC breaker NG0410 and battery set PK14. Cables and equipment associated with the 125 VDC power supply to PN04 could be affected by a fire in this area. Redundant 480 VAC power to inverter PN04 is from PG20GAF4. PN04 and PG20GAF4 are located in fire area A-27 and are not affected by a fire in this area. Therefore, power to PN410 will be available if a fire occurs in this area.

References: XX-E-013, E-15000, E-1005-SY01, E-11NG02, E-11PK01, E-11PK02, E-11PK04, E-13AE20, E-13BG10, E-13BM06D, E-13EM05A, E-13GK13, E-13GK13A, E-13GK31, E-13MR10, E-13PA14, E-13PB02, E-13PK01, E-13PK10, E-13PK11, E-13PK13, E-13RL01, E-13RL02, E-1F9201, E-1F9301, E-1F9421, E-1F9422C, E-1F9426, KD-7496, DCP 13324

5.1.8 Reactor Coolant Pumps

The reactor coolant pumps are not credited in the PFSSD analysis. However, the capability to stop the pumps from the control room in the event of a loss of all seal cooling is credited. Westinghouse Technical Bulletin TB-04-22, Rev. 1 recommends that if all seal cooling is lost (RCP seal injection and thermal barrier heat exchanger flow), operators need to stop the pumps before a seal LOCA occurs.

Several control cables associated with each reactor coolant pump are run in this fire area. Damage to these cables in the event of a fire could prevent operators from stopping the RCPs from the control room. However, a fire in this area will not cause a loss of all seal cooling since thermal barrier cooling and seal injection remain available.

Based on the above discussion, the inability to trip the RCPs from the control room will have no adverse impact on PFSSD. The pumps can continue to operate, providing forced flow circulation. If the pumps spuriously stop, natural circulation cooldown can be used.

References: E-15000, XX-E-013, E-13BB01, Westinghouse TB-04-22 Rev. 1

5.2 PFSSD CABLE EVALUATION

Table 4 lists all the PFSSD cables (S. in E-15000) located in fire areas CC-1, T-1, T-2 and TURB. The applicable evaluation section is also listed in Table 4.

All PFSSD cables that run in this fire area terminate at their associated PFSSD equipment within this area. Therefore, all cable evaluations are included with the equipment evaluations in Section 5.1.

Table 4
PFSSD Cables Located in Fire Areas CC-1, T-1, T-2 and TURB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
14ABK08DA	4401W	ABUV0034	C	5.1.4	Cooldown Condenser Dump Valve
14ABK08EA	4401W	ABUV0045	C	5.1.4	Cooldown Condenser Dump Valve
14ABK08FA	4401W	ABUV0041	C	5.1.4	Cooldown Condenser Dump Valve
14ABK11AA	4401W	ABUV0037	C	5.1.4	Cooldown Condenser Dump Valve
14ABK11BA	4401W	ABUV0038	C	5.1.4	Cooldown Condenser Dump Valve
14ABK11CA	4401W	ABUV0039	C	5.1.4	Cooldown Condenser Dump Valve
14ABK11DA	4401W	ABUV0040	C	5.1.4	Cooldown Condenser Dump Valve
14ABK11EA	4401W	ABUV0036	C	5.1.4	Cooldown Condenser Dump Valve
14ABK11FA	4401W	ABUV0042	C	5.1.4	Cooldown Condenser Dump Valve
14ABK11GA	4401W	ABUV0043	C	5.1.4	Cooldown Condenser Dump Valve
14ABK11HA	4401W	ABUV0044	C	5.1.4	Cooldown Condenser Dump Valve
14ABK11JA	4401W	ABUV0035	C	5.1.4	Cooldown Condenser Dump Valve
15ABG02AA	4301, 4301W, 4302, 4322, 4351, 4401, 4401W, 4501	ABHV0031	P	5.1.4	Main Steam Supply To MSR A&C 2nd Stage
15ABG02AB	4301, 4301W, 4302, 4322, 4351, 4401, 4401W, 4501	ABHV0031	C	5.1.4	Main Steam Supply To MSR A&C 2nd Stage
15ABG02AC	3304, 3502, 3503, 4301, 4302, 4322, 4351	ABHV0031	C	5.1.4	Main Steam Supply To MSR A&C 2nd Stage
15ABG02AD	4301, 4302, 4322, 4351, 4401	ABHV0031	C	5.1.4	Main Steam Supply To MSR A&C 2nd Stage

Table 4
PFSSD Cables Located in Fire Areas CC-1, T-1, T-2 and TURB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15ABY04AA	3502, 3503, 4401, 4401W	ABFV0023, ABFV0025, ABFV0027, ABFV0029	C	5.1.4	Main Steamline Drain Valves
15ABY04AB	3502, 3503, 4301, 4301W, 4302, 4351, 4401, 4401W	ABFV0023, ABFV0025, ABFV0027, ABFV0029	C	5.1.4	Main Steamline Drain Valves
15ABY04AC	4351	ABFV0023, ABFV0025, ABFV0027, ABFV0029	C	5.1.4	Main Steamline Drain Valves
15ABY04AD	4351	ABFV0023, ABFV0025, ABFV0027, ABFV0029	C	5.1.4	Main Steamline Drain Valves
15ABY04AE	4351	ABFV0023, ABFV0025, ABFV0027, ABFV0029	C	5.1.4	Main Steamline Drain Valves
15ABY18BA	3502, 3503, 4301W, 4401, 4401W	ABLV0051	C	5.1.4	Main Steam Header to Steam Dumps Trap Bypass
15ABY18BB	3304, 3502, 3503, 4301, 4301W	ABLSH0051	C	5.1.4	Main Steam Header to Steam Dumps Trap Bypass Level Switch
15ABY18DA	3502, 3503, 4301W, 4401, 4401W	ABLV0053	C	5.1.4	Main Steam Header to Steam Dumps Trap Bypass
15ABY18DB	3304, 3502, 3503, 4301, 4301W	ABLSH0053	C	5.1.4	Main Steam Header to Steam Dumps Trap Bypass Level Switch
15ACK07AB	4401, 4401W, 4405, 4504	ACFCV0043 ACFCV0044 ACFCV0045 ACFCV0046	P	5.1.4	Main Turbine Stop Valves
15ACQ15BA	3503, 3619, 4401, 4504	ACHS0002A ACHS0002B	C	5.1.4	Main Turbine Master Trip Pushbuttons

Table 4
PFSSD Cables Located in Fire Areas CC-1, T-1, T-2 and TURB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15BBA01AB	3503, 3619, 4401, 4401N, 4401W	DPBB01A	C	5.1.8	Reactor Coolant Pump A Motor
15BBA01AC	3503, 3619, 4401, 4401N, 4401W	DPBB01A	C	5.1.8	Reactor Coolant Pump A Motor
15BBA01AJ	3503, 4101, 4401, 4401W	DPBB01A	C	5.1.8	Reactor Coolant Pump A Motor
15BBA01AL	3503, 4101, 4401, 4401W	DPBB01A	C	5.1.8	Reactor Coolant Pump A Motor
15BBA01BB	3503, 3619, 4401, 4401N, 4401W	DPBB01B	C	5.1.8	Reactor Coolant Pump B Motor
15BBA01BC	3503, 3619, 4401, 4401N, 4401W	DPBB01B	C	5.1.8	Reactor Coolant Pump B Motor
15BBA01BJ	3503, 4101, 4401, 4401W	DPBB01B	C	5.1.8	Reactor Coolant Pump B Motor
15BBA01BL	3503, 4101, 4401, 4401W	DPBB01B	C	5.1.8	Reactor Coolant Pump B Motor
15FBG12AA	4401, 4501, 4501W	FBHV0081	P	5.1.4	Main Steam/Extraction Steam Xconnect Valve
15FBG12AB	4401, 4501, 4501W	FBHV0081	C	5.1.4	Main Steam/Extraction Steam Xconnect Valve
15FBG12AC	3304, 3502, 3503, 4301, 4301W, 4401, 4401W	FBHV0081	C	5.1.4	Main Steam/Extraction Steam Xconnect Valve
15FCQ29AE	3502, 3503, 4301W, 4401, 4401W	FCFV0005	C	5.1.4	Steam Generator Feed Pump A Turbine Stop Valve
15FCY08AA	3304, 3502, 3503, 4301, 4301W, 4351	FCHV0003	C	5.1.4	SGFWP Turb A Main Steamline Low Pt Drain
15FCY08AB	3304, 3502, 3503, 4301, 4301W	FCLSH0003	C	5.1.4	SGFWP Turb A Main Steamline Low Pt Drain Switch

Table 4
PFSSD Cables Located in Fire Areas CC-1, T-1, T-2 and TURB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15FCY35AA	3503, 4301W, 4401, 4401W	FC169A	P	5.1.4	Steam Generator Feed Pump A Term Cabinet
15GKK31CA	3303, 3304, 3402, 3503, 3619, 4301, 4301W, 4401, 4401W	95XGK07	C	5.1.1	SGK05A Fire Signal Isolation
15GKK31CB	3303, 3304, 3402, 3502, 3503	95XGK07	C	5.1.1	SGK05A Fire Signal Isolation
15MRK10AB	3503, 3619, 4301W, 4401, 4401W	MA104E	P	5.1.5	125 VDC power from PK6106 to MA104E
15MRK10AC	3503, 3619, 4301W, 4401, 4401W	MA104E	P	5.1.5	125 VDC power from PK6106 to MA104E
15NBA10AA	3503, 3619, 4301W, 4401, 4401W	NB01	C	5.1.5	Train A ESF Transformer
15NBA10AC	4301W, 4401W	NB01	C	5.1.5	Train A ESF Transformer
15NBA10AD	3304, 3502, 3503, 4301, 4301W, 4401W	NB01	C	5.1.5	Train A ESF Transformer
15NBB03AA	3225, 3226, 3227, 3304	NB01	P	5.1.5	Phase A Power Feed XNB01 to NB01
15NBB03AC	3225, 3226, 3227, 3304	NB01	P	5.1.5	Phase B Power Feed XNB01 to NB01
15NBB03AE	3225, 3226, 3227, 3304	NB01	P	5.1.5	Phase C Power Feed XNB01 to NB01
15NBB03AH	4301W, 4401W	NB01	P	5.1.5	XNB01 AC Time Overcurrent Relay
15NBB03AJ	3503, 3619, 4301W, 4401, 4401W	NB01	P	5.1.5	XNB01 Differential Relay
15NBB03AL	4301W, 4401W	NB01	P	5.1.5	XNB01 Differential Relay

Table 4
PFSSD Cables Located in Fire Areas CC-1, T-1, T-2 and TURB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15NBK10AA	3503, 3619, 4301W, 4401, 4401W	NB01	P	5.1.5	Control power to MA104F
15PAK14AA	4301W, 4401W, 4405	PA01	P	5.1.6	Bus PA01 Breaker Control Power
15PAK14AB	4301W, 4401W, 4405	PA01	P	5.1.6	Bus PA01 Breaker Control Power
15PGA10AA	3503, 4401, 4401W	PA0105	C	5.1.6	Load Centers PG11, PG13 and PG25 Fdr Bkr
15PGA10AB	4401W	PA0105	C	5.1.6	Load Centers PG11, PG13 and PG25 Fdr Bkr
15PGA10AC	3503, 4401, 4401W	PA0105	C	5.1.6	Load Centers PG11, PG13 and PG25 Fdr Bkr
15PGA10AD	4301, 4301W, 4302, 4322, 4351, 4401W	PA0105	C	5.1.6	Load Centers PG11, PG13 and PG25 Fdr Bkr
15PGA10BA	3503, 3619, 4401, 4401W	PA0106	C	5.1.6	Load Centers PG15, PG17 and PG19 Fdr Bkr
15PGA10BB	3503, 3619, 4401, 4401W	PA0106	C	5.1.6	Load Centers PG15, PG17 and PG19 Fdr Bkr
15PGA10BC	3503, 4401, 4401W	PA0106	C	5.1.6	Load Centers PG15, PG17 and PG19 Fdr Bkr
15PGA10BD	4401W, 4401N	PA0106	C	5.1.6	Load Centers PG15, PG17 and PG19 Fdr Bkr
15PGG01AA	4301W, 4316, 4317, 4401W	PG11	P	5.1.5 5.1.6	Power from PA0105 to PG1300
15PGG01AB	4301, 4301W, 4302, 4316, 4351, 4401W	PG11	P	5.1.6	Power from PG1300 to PG1100
15PGG01AD	4351	ABHV0031	P	5.1.6	Main Steam Supply to 2nd Stage Reheat
15PGG01AE	4351	ABHV0031	P	5.1.6	Main Steam Supply to 2nd Stage Reheat
15PGG01AF	4351, 4401	FBHV0081 AC119	P	5.1.6	MSIV Downstream Components

Table 4
PFSSD Cables Located in Fire Areas CC-1, T-1, T-2 and TURB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15PGG01AG	4351, 4401	FBHV0081 AC119	P	5.1.6	MSIV Downstream Components
15PGG02AA	4316, 4401W	PG19	P	5.1.6	480V Non-Class 1E LC Feeder From PA0106
15PGG02AB	3304, 4301, 4301W, 4316, 4317, 4401W	PG19	P	5.1.6	480V Non-Class 1E LC Feeder From PG1500
15PGG13AA	3502, 3503, 4301, 4302, 4351	PG1101	C	5.1.6	Load Center PG11 Incoming Feeder Breaker
15PGG13AC	4301, 4301W, 4302, 4351, 4401W, 4401N	PG1101	C	5.1.6	Load Center PG11 Incoming Feeder Breaker
15PGG13DC	3503, 3619, 4401, 4401W, 4401N	PG1901	C	5.1.6	Bus PG19 Feeder Breaker
15PKG10AA	3304, 4301, 4401, 4401W, 4405	PK21	P	5.1.7	480 VAC Power to Non-Class 1E Battery Charger PK21 from NG0102
15PKK01AA	4316, 4404, 4405	PK01	P	5.1.7	125 VDC power from battery PK11 to PK0101
15PKK01AB	4316, 4404, 4405	PK01	P	5.1.7	125 VDC power from battery PK11 to PK0101
15PKK01AC	4316, 4405	PK01	P	5.1.7	125 VDC power from battery PK21 to PK0102
15PKK01AD	4316, 4405	PK01	P	5.1.7	125 VDC power from battery PK21 to PK0102
15PKK01AE	4405	PK41	P	5.1.7	125 VDC power from PK0104 to PK4100
15PKK01AJ	3503, 3619, 4301W, 4401, 4401W, 4405	PK61	P	5.1.7	125 VDC power from PK0106 to PK6100
15PKK01AL	3503, 3619, 4301W, 4401, 4401W, 4405	PK51	P	5.1.7	125 VDC power from PK0112 to PK5100
15PKK01AM	3503, 3619, 4301W, 4401, 4401W, 4405	PK51	P	5.1.7	125 VDC power from PK0112 to PK5100
15PKK01AV	4405	PK41	P	5.1.7	125 VDC power from PK0104 to PK4100

Table 4
PFSSD Cables Located in Fire Areas CC-1, T-1, T-2 and TURB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15PKK01AW	3503, 3619, 4301W, 4401, 4401W, 4405	PK61	P	5.1.7	125 VDC power from PK0106 to PK6100
15PNK02AA	3503, 3619, 4405, 4401, 4401W	PN03	P	5.1.7	125 VDC Power from PK0105 to PN03
15PNK02AB	3503, 3619, 4405, 4401, 4401W	PN03	P	5.1.7	125 VDC Power from PK0105 to PN03
15SY134	3225, 3226, 3228, 3303, 3304, 3402, 3502, 4301, 4302, 4322	NB01	C	5.1.5	Off-site Power Breaker 13-48
15UU003	3225, 3227, 3228, 3303, 3304, 3402, 3502, 4301, 4302, 4322	NB01	I	5.1.5	Off-site Power Breaker 13-8
16ABG02BA	4401, 4401W	ABHV0032	P	5.1.4	Main Stm Sup to MSR B&D 2nd Stage Iso Vlv
16ABG02BB	4401, 4401W	ABHV0032	C	5.1.4	Main Stm Sup to MSR B&D 2nd Stage Iso Vlv
16ABG02BC	3619, 3701, 3702, 3703, 3704, 4401W	ABHV0032	C	5.1.4	Main Stm Sup to MSR B&D 2nd Stage Iso Vlv
16ABG02BD	4401, 4401W	ABHV0032	C	5.1.4	Main Stm Sup to MSR B&D 2nd Stage Iso Vlv
16ABG22AA	4301, 4301W, 4302, 4322, 4351, 4401W	ABHV0046	P	5.1.4	Main Steam to Steam Seal System
16ABG22AB	4301, 4301W, 4302, 4322, 4351, 4401W	ABHV0046	C	5.1.4	Main Steam to Steam Seal System
16ABG22AC	3619, 3701, 3702, 3703, 3704, 4401W	ABHV0046	C	5.1.4	Main Steam to Steam Seal System
16ABY18AA	3304, 3502, 3503, 3614, 3701, 3803, 4301, 4301W, 4351	ABLV0050	C	5.1.4	Main Steam Header to Steam Dumps Trap Bypass

Table 4
PFSSD Cables Located in Fire Areas CC-1, T-1, T-2 and TURB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16ABY18AB	3304, 3503, 3619, 3701, 3703, 3704, 4301, 4301W	ABLSH0050	C	5.1.4	Main Stm Line/Hi Pressure Trap Level Switch
16ABY18CA	3619, 3701, 3702, 3703, 3704, 4301, 4301W, 4401	ABLV0052	C	5.1.4	Main Steam Header to Steam Dumps Trap Bypass
16ABY18CB	3304, 3503, 3619, 3701, 3703, 3704, 4301, 4301W	ABLSH0052	C	5.1.4	Main Stm Line/Hi Pressure Trap Level Switch
16AEB20AD	3503, 3701, 3702, 3703, 3704, 4401, 4401W	DPAE02	C	5.1.7	Motor Driven Main Feedwater Pump
16BBA01CB	3503, 3701, 3702, 3703, 3704, 4401, 4401N, 4401W	DPBB01C	C	5.1.8	Reactor Coolant Pump C Motor
16BBA01CC	3503, 4401, 4401N, 4401W	DPBB01C	C	5.1.8	Reactor Coolant Pump C Motor
16BBA01CJ	3701, 3704, 3705, 4101, 4401, 4401W	DPBB01C	C	5.1.8	Reactor Coolant Pump C Motor
16BBA01CL	3701, 3704, 3705, 4101, 4401, 4401W	DPBB01C	C	5.1.8	Reactor Coolant Pump C Motor
16BBA01DB	3503, 3701, 3702, 3703, 3704, 4401, 4401N, 4401W	DPBB01D	C	5.1.8	Reactor Coolant Pump D Motor
16BBA01DC	3503, 4401, 4401N, 4401W	DPBB01D	C	5.1.8	Reactor Coolant Pump D Motor
16BBA01DJ	3701, 3704, 3705, 4101, 4401, 4401W	DPBB01D	C	5.1.8	Reactor Coolant Pump D Motor
16BBA01DL	3701, 3704, 3705, 4101, 4401, 4401W	DPBB01D	C	5.1.8	Reactor Coolant Pump D Motor
16FBG12BA	4401W, 4501W	FBHV0080	P	5.1.4	Main Steam Iso to Aux Steam Reboiler

Table 4
PFSSD Cables Located in Fire Areas CC-1, T-1, T-2 and TURB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16FBG12BB	4401W, 4501W	FBHV0080	C	5.1.4	Main Steam Iso to Aux Steam Reboiler
16FBG12BC	3619, 3701, 3702, 3703, 3704, 4401W	FBHV0080	C	5.1.4	Main Steam Iso to Aux Steam Reboiler
16FCQ29AE	3619, 3701, 3702, 3703, 3704, 4301W, 4401W	FCFV0105	C	5.1.4	Steam Generator Feed Pump B Turbine Stop Valve
16FCY08CA	3619, 3701, 3702, 3703, 3704, 4301, 4301W, 4351, 4401, 4401W	FCHV0103	C	5.1.4	SGFWP Turb B Main Steamline Low Pt Drain
16FCY08CB	3619, 3701, 3702, 3703, 3704, 4301, 4301W, 4351, 4401, 4401W	FCLSH0103	C	5.1.4	SGFWP Turb B Main Steamline Low Pt Drain
16FCY35AA	3503, 4301W, 4401, 4401W	FC170A	P	5.1.4	Steam Generator Feed Pump B Term Cabinet
16GKK31DA	3303, 3304, 3503, 4301, 4401	SGK05B	C	5.1.1	Fire signal isolation
16GKK31DB	3303, 3304, 3503, 4301, 4401	SGK05B	C	5.1.1	Fire signal isolation
16KCQ13SA	3303, 3304, 3503, 3619, 4301, 4401	SGK05A	C	5.1.1	Fire Detection Actuation Circuit
16KCQ21DA	3303, 3304, 3503, 3619, 4301, 4401	SGK05B	C	5.1.1	Fire Detection Actuation Circuit
16KCQ21EA	3503, 3619	SGK05B	C	5.1.1	Fire Detection Actuation Circuit
16KCQ21FA	3503, 3619	SGK05A	C	5.1.1	Fire Detection Actuation Circuit
16KCQ21HA	3503, 3619	SGK05B	C	5.1.1	Fire Detection Actuation Circuit
16KCQ21JA	3503, 3619	SGK05A	C	5.1.1	Fire Detection Actuation Circuit

Table 4
PFSSD Cables Located in Fire Areas CC-1, T-1, T-2 and TURB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16MRK10AA	4301W, 4316, 4401W, 4405	MA104D	P	5.1.7	125 VDC power from PK6216 to MA104D
16MRK10AD	4301W, 4316, 4401W, 4405	MA104D	P	5.1.7	125 VDC power from PK6216 to MA104D
16NBA10AB	3503, 4401, 4401W	XNB01	C	5.1.5	Train A ESF Transformer Protection
16NBA11AA	4301W, 4401W	PA0201	C	5.1.5	Transformer XNB02 Feeder Breaker
16NBA11AB	3503, 3701, 3702, 3703, 3704, 4401, 4401W	PA0201	C	5.1.5	Transformer XNB02 Feeder Breaker
16NBA11AC	3503, 4401, 4401W	PA0201	C	5.1.5	Transformer XNB02 Feeder Breaker
16NBA11AD	4401W	PA0201	C	5.1.5	Transformer XNB02 Feeder Breaker
16NBA11AE	3503, 4401, 4401W	PA0201	C	5.1.5	Transformer XNB02 Feeder Breaker
16NBB03AB	3503, 4401, 4401W	NB0212	P	5.1.5	XNB01 to NB02 Differential Protective Relay
16NBB05AA	3227, 3304	NB02	P	5.1.5	Main Power Feed from XNB02 to NB02
16NBB05AB	3227, 3304	NB02	P	5.1.5	Main Power Feed from XNB02 to NB02
16NBB05AC	3227, 3304	NB02	P	5.1.5	Main Power Feed from XNB02 to NB02
16NBB05AD	3503, 4401, 4401W	NB02	P	5.1.5	PA0201 to NB0209 Differential Relay
16NBB05AG	4301W, 4316, 4401W	NB02	P	5.1.5	Main Power Feed from PA0201 to XNB02
16NBB05AH	4301W, 4316, 4401W	NB02	P	5.1.5	Main Power Feed from PA0201 to XNB02
16NBB05AJ	4301W, 4316, 4401W	NB02	P	5.1.5	Main Power Feed from PA0201 to XNB02
16NBB05AK	4301W, 4401W	NB02	P	5.1.5	XNB01 AC Time Overcurrent Relay
16NBB05AL	3503, 4401, 4401W	NB02	P	5.1.5	PA0201 to NB0109 Differential Relay
16PAK14AA	4401W, 4405	NB02	P	5.1.7	PA02 Breaker Control Power from PK6204

Table 4
PFSSD Cables Located in Fire Areas CC-1, T-1, T-2 and TURB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16PAK14AB	4401W, 4405	NB02	P	5.1.7	PA02 Breaker Control Power from PK6204
16PGA10CA	3503, 4401, 4401W, 4401N	PA0206	C	5.1.6	Load Centers PG12, PG16 and PG26 Fdr Bkr
16PGA10CB	4301, 4302, 4351, 4401W, 4401N	PA0206	C	5.1.6	Load Centers PG12, PG16 and PG26 Fdr Bkr
16PGA10CC	3503, 3701, 3704, 4401, 4401W, 4401N	PA0206	C	5.1.6	Load Centers PG12, PG16 and PG26 Fdr Bkr
16PGA10CD	4401W, 4401N	PA0206	C	5.1.6	Load Centers PG12, PG16 and PG26 Fdr Bkr
16PGA11AA	3503, 4401, 4401W, 4401N	PA0207	C	5.1.6	Load Centers PG14, PG18, PG20 and PG24 Fdr Bkr
16PGA11AB	3503, 3701, 3704, 4401, 4401W, 4401N	PA0207	C	5.1.6	Load Centers PG14, PG18, PG20 and PG24 Fdr Bkr
16PGA11AC	3503, 4401, 4401W, 4401N	PA0207	C	5.1.6	Load Centers PG14, PG18, PG20 and PG24 Fdr Bkr
16PGA11AD	4401W, 4401N	PA0207	C	5.1.6	Load Centers PG14, PG18, PG20 and PG24 Fdr Bkr
16PGA11AE	3503, 4401, 4401W, 4401N	PA0207	C	5.1.6	Load Centers PG14, PG18, PG20 and PG24 Fdr Bkr
16PGG03AA	4316, 4323, 4401W	PG12	P	5.1.6	13.8 kV Power from PA0206 to PG1600
16PGG03AB	4301, 4301W, 4316, 4323, 4351, 4401W	PG12	P	5.1.6	13.8 kV Power from PG1600 to PG1200
16PGG03AF	4301, 4301W, 4351, 4401W	PG12K	P	5.1.6	480 VAC Power from PG1207 to PG12KAF6
16PGG03AG	4301, 4301W, 4351, 4401W	PG12K	P	5.1.6	480 VAC Power from PG1207 to PG12KAF6
16PGG04AA	4301W, 4316, 4401W	PG20G	P	5.1.6	13.8 kV Power from PA0207 to PG1400

Table 4
PFSSD Cables Located in Fire Areas CC-1, T-1, T-2 and TURB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16PGG04AB	3304, 3503, 4301, 4301W, 4316, 4401W	PG20G	P	5.1.6	13.8kV Power from PG1400 to PG2400
16PGG13AA	3304, 3503, 3619, 3701, 3704, 4301, 4302, 4351	PG1201	C	5.1.6	Load Center PG12 Feeder Breaker
16PGG13AC	4301, 4302, 4351, 4401, 4401W	PG1201	C	5.1.6	Load Center PG12 Feeder Breaker
16PGG13DC	3503, 4401, 4401W, 4401N	PG2001	C	5.1.6	Load Center PG20 Feeder Breaker
16PKG11BA	3304, 3503, 3619, 4401, 4401W, 4405	PK02	P	5.1.7	480 VAC Power to Non-Class 1E Battery Charger PK22 from NG0409
16PKG13AA	3304, 3503, 3614, 3619	PK24	P	5.1.7	480 VAC Power from NG0410 to PK24
16PKK02AA	4316, 4404, 4405	PK02	P	5.1.7	Conductor 1P from PK12 West to PK0201
16PKK02AB	4316, 4404, 4405	PK02	P	5.1.7	Conductor 1P from PK12 East to PK0201
16PKK02AC	4316, 4405	PK02	P	5.1.7	125 VDC Power from PK22 to PK0202
16PKK02AD	4404	PK02	P	5.1.7	PK12 East to PK12 West
16PKK02AH	4404	PK02	P	5.1.7	PK12 East to PK12 West
16PKK02AL	4316, 4405	PK62	P	5.1.7	125 VDC Power from PK0206 to PK6200
16PKK02AN	3503, 4301, 4301W, 4316, 4401, 4405	PK52	P	5.1.7	125 VDC Power from PK0211 to PK5200
16PKK02AP	3503, 4301, 4301W, 4316, 4401, 4405	PK52	P	5.1.7	125 VDC Power from PK0211 to PK5200
16PKK02AU	4316, 4405	PK02	P	5.1.7	125 VDC Power from PK22 to PK0202
16PKK02AW	4316, 4405	PK62	P	5.1.7	125 VDC Power from PK0206 to PK6200

Table 4
PFSSD Cables Located in Fire Areas CC-1, T-1, T-2 and TURB

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
16PKK04AA	3704, 3705	PK04	P	5.1.7	125 VDC Power from PK14 to PK0401
16PKK04AB	3704, 3705	PK04	P	5.1.7	125 VDC Power from PK14 to PK0401
16PKK04AC	3704	PK04	P	5.1.7	+125 VDC Power from PK24 to PK0402
16PKK04AD	3704	PK04	P	5.1.7	-125 VDC Power from PK24 to PK0402
16PKK04AE	3705	PK04	P	5.1.7	PK14 East to PK14 West
16PKK04AF	3705	PK04	P	5.1.7	PK14 East to PK14 West
16PNK02AA	3503, 3619	PN04	P	5.1.7	125 VDC Power from PK0407 to PN04
16PNK02AB	3503, 3619	PN04	P	5.1.7	125 VDC Power from PK0407 to PN04

FIRE AREA T-4

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area T-4 is located on the 2000 elevation of the Turbine Building and includes the room listed in Table T-4-1.

Table T-4-1
Rooms Located in Fire Area T-4

ROOM #	DESCRIPTION
4308	Lube Oil Storage Tank Room

Fire area T-4 is protected with automatic flame detection and an automatic fire suppression system. The area is separated on all sides by minimum 3-hour fire resistance rated barriers.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Fire area T-4 contains no post-fire safe shutdown cables or equipment. Therefore, both trains of PFSSD equipment are available if a fire occurs in this area.

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

Not applicable to fire area T-4.

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

A detailed analysis is not required since this area contains no PFSSD cables or components.

FIRE AREA T-10

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area T-10 is located on the 2033 elevation of the Turbine Building and includes the room listed in Table T-10-1.

Table T-10-1
Rooms Located in Fire Area T-10

ROOM #	DESCRIPTION
4403	Lube Oil Resevoir Room

Fire area T-10 is protected with automatic flame and heat detection and an automatic fire suppression system. The area is separated on all sides by minimum 3-hour fire resistance rated barriers.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Fire area T-10 contains no post-fire safe shutdown cables or equipment. Therefore, both trains of PFSSD equipment are available if a fire occurs in this area.

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

Not applicable to fire area T-10.

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

A detailed analysis is not required since this area contains no PFSSD cables or components.

FIRE AREA YARD

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area YARD consists of the area around the switchyard.

Table YARD-1 Rooms Located in Fire Area YARD	
ROOM #	**DESCRIPTION**
N/A	Switchyard

There is no automatic fire suppression or detection in the switchyard.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table YARD-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the potential fire impact on some of the more significant PFSSD equipment, see Section 8.0 of the Fire Area Analysis Narrative section.

Table YARD-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area YARD

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD

Table YARD-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area YARD

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
MR	Startup Transformer	S	Offsite power to the startup transformer could be lost, causing a loss of offsite power to NB02. Onsite power remains available.

Table YARD-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area YARD

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	Offsite power to NB01 and NB02 could be affected. Onsite power to NB01 and NB02 remains available.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
PA	13.8kV	S	Offsite power to PA01 and PA02 could be lost. PFSSD is assured using onsite power to feed essential PFSSD equipment using NB01 and/or NB02.
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
PL	Local Instrument Panels	S	Switchyard supervisory panel 0PL09J could be affected. This will not affect PFSSD since on-site power remains available.
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD

Table YARD-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area YARD			
System	**System Name**	**PFSSD Function***	**Comments**
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD
SY	Switchyard	S	A fire in this area could affect off-site power. On-site power remains available.
UU	Supervisory System	S	The switchyard supervisory system could be affected. This will not affect PFSSD since on-site power remains available.

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area YARD. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this fire area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area YARD.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA YARD

PFSSD components (S. in E-15000) located in fire area YARD are shown in Table YARD-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table YARD-3.

Table YARD-3
PFSSD Equipment Located in Fire Area YARD

Room #	PFSSD Equipment	Description	Evaluation Section	Comments
YARD	0PL09J	Swyd Remote Supervisory Cabinet	5.1.1	
YARD	TBC04	13.8 KV Swyd Breaker 13-48 Control	5.1.1	
YARD	TBSY01	13.8 KV Swyd Breaker 13-48 Control	5.1.1	Interposing Terminal Box for cables 15SY124 & 15SY135

5.1.1 Main Switchyard

Switchyard supervisory panel 0PL09J and terminal box TBC04 are included in the PFSSD design to ensure the ability to isolate off-site power in the event of a fire in areas C-9 and C-10 (ESF Switchgear Rooms). Cables 15SY124, 15SY135, and 15UU003 are also included in the PFSSD design for the same purpose.

Cables 15SY124 & 15SY135 are associated with the run from 1HSSY0022 on panel RL014 to TBC04. Hand switch 1HSSY0022 is the control switch for switchyard breaker 13-48. Breaker 13-48 is one of two redundant off-site power feeders to bus NB01. Damage to these cables could cause breaker 13-48 to trip or prevent the breaker from being closed, causing a loss of this power source to NB01.

Cable 15UU003 runs from panel RP060 (1PM01J) to 0PL09J. This cable is associated with handswitch 1HSSY0018, which is the control switch for switchyard breaker 13-8. Breaker 13-8 is one of two redundant off-site power feeders to bus NB01. Damage to this cable could cause breaker 13-8 to trip or prevent the breaker from being closed, causing a loss of this power source to NB01.

Based on the above discussion, a fire in the switchyard could cause a loss of off-site power to NB01 due to damage to these cables and components. For the purpose of this analysis, bus NB02 off-site power is assumed lost since cables and components associated with NB02 off-site power supply are not analyzed. If off-site power is lost to NB01 and NB02, the on-site power supply from the emergency diesel generators remains available. Therefore, a switchyard fire will not adversely impact the ability to achieve and maintain safe shutdown.

References: XX-E-013, E-15000, E-1000-SY00, E-1000-SY12, E-1000-UU00, E-1005-SY01, E-1005-SY07, E-1251, E-1282, E-1442, E-1F9425, E-1F9426, KD-7496, CCP 12081

5.2 PFSSD CABLE EVALUATION

Table YARD-4 lists all the PFSSD cables (S. in E-15000) located in fire area YARD. The applicable evaluation section is also listed in Table YARD-4.

Table YARD-4 **PFSSD Cables Located in Fire Area YARD**					
Cable #	**Location**	**Primary PFSSD Equipment**	**Cable Function** (P) Power (C) Control (I) Instrumentation	**Evaluation Section**	**Comments**
15SY124	YARD	Swyd Breaker 13-48	C	5.1.1	
15SY135	YARD	Swyd Breaker 13-48	C	5.1.1	
15UU003	YARD	Swyd Breaker 13-8	I	5.1.1	

FIRE AREA YARD-ESF (YARD1)

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1.0 GENERAL AREA DESCRIPTION

Fire area YARD1 consists of the area around the engineered safety features (ESF) transformers.

Table YARD1-1 Rooms Located in Fire Area YARD1	
ROOM #	**DESCRIPTION**
EXFMR	ESF Transformer Area

The ESF transformers are provided with automatic fire suppression and detection. A concrete block wall separates the two transformers to limit the spread of fire from one transformer to the other.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table YARD1-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the potential fire impact on some of the more significant PFSSD equipment, see Section 8.0 of the Fire Area Analysis Narrative section.

Table YARD1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area YARD1

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1

Table YARD1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area YARD1

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
MR	Startup Transformer	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1

Table YARD1-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area YARD1

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	Off-site power to NB01 and NB02 could be affected. The Train A and Train B emergency diesel generators remain available to power NB01 and NB02.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1

Table YARD1-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area YARD1			
System	**System Name**	**PFSSD Function***	**Comments**
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD1

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area YARD1. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this fire area.

5.0 DETAILED ANALYSIS

This section describes the detailed analysis for a fire in area YARD1.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA YARD1

PFSSD components (S. in E-15000) located in fire area YARD1 are shown in Table YARD1-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table YARD1-3.

Table YARD1-3 PFSSD Equipment Located in Fire Area YARD1				
Room #	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
EXFMR	XNB01	Train A ESF Transformer	5.1.1	
EXFMR	XNB02	Train B ESF Transformer	5.1.1	

5.1.1 ESF Transformer Area

ESF transformers XNB01 and XNB02 supply off-site power to safety related buses NB01 and NB02. The ESF transformers are located in this area. Power and control cables identified in Table YARD1-4 are associated with NB01 and NB02. Damage to these cables or the transformers could cause a loss of offsite power to NB01 and NB02.

If a fire in this area causes a loss of offsite power to NB01 and NB02, on-site power from both emergency diesel generators remains available to supply power to both safety related buses. Therefore, a fire in this area will not adversely impact post-fire safe shutdown.

References: E-15000, XX-E-013, E-13NB03, E-13NB05, E-13NB06, E-13NB10, E-13NB11, E-1F9425, E-1F9426

5.2 PFSSD CABLE EVALUATION

Table YARD1-4 lists all the PFSSD cables (S. in E-15000) located in fire area YARD1. The applicable evaluation section is also listed in Table YARD1-4.

Table YARD1-4
PFSSD Cables Located in Fire Area YARD1

Cable #	Location	Primary PFSSD Equipment	Cable Function (P) Power (C) Control (I) Instrumentation	Evaluation Section	Comments
15NBA10AC	YARD1	XNB01	C	5.1.1	Train A ESF Transformer
15NBB03AA	YARD1	NB01	P	5.1.1	Train A ESF Transformer to NB01
15NBB03AC	YARD1	NB01	P	5.1.1	Train A ESF Transformer to NB01
15NBB03AE	YARD1	NB01	P	5.1.1	Train A ESF Transformer to NB01
15NBB03AH	YARD1	NB01	P	5.1.1	Train A ESF Transformer to MA104F
15NBB03AL	YARD1	NB01	P	5.1.1	Train A ESF Transformer to MA104F
16NBA11AA	YARD1	XNB02	C	5.1.1	PA0201 to XNB02
16NBB05AA	YARD1	NB02	P	5.1.1	Train B ESF Transformer to NB0209
16NBB05AB	YARD1	NB02	P	5.1.1	Train B ESF Transformer to NB0209
16NBB05AC	YARD1	NB02	P	5.1.1	Train B ESF Transformer to NB0209
16NBB05AG	YARD1	XNB02	P	5.1.1	PA0201 to Train B ESF Transformer
16NBB05AH	YARD1	XNB02	P	5.1.1	PA0201 to Train B ESF Transformer
16NBB05AJ	YARD1	XNB02	P	5.1.1	PA0201 to Train B ESF Transformer
16NBB05AK	YARD1	XNB02	P	5.1.1	PA0201 to Train B ESF Transformer

FIRE AREA YARD – MAIN (YARD2)

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1.0 GENERAL AREA DESCRIPTION

Fire area YARD2 is located on the north side of the Turbine Building and includes the area listed in Table YARD2-1.

Table YARD2-1
Rooms Located in Fire Area YARD2

ROOM #	DESCRIPTION
MXFMR	Main Transformer Area

Each main transformer is protected with automatic heat detection and an automatic fire suppression system.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Fire area YARD2 contains no post-fire safe shutdown cables or equipment. Therefore, both trains of PFSSD equipment are available if a fire occurs in this area.

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

Not applicable to fire area YARD2.

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this area.

5.0 DETAILED ANALYSIS

A detailed analysis is not required since this area contains no PFSSD cables or components.

FIRE AREA YARD-SU (YARD3)

DETAILED ANALYSIS

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1.0 GENERAL AREA DESCRIPTION

Fire area YARD3 consists of the area around the startup transformer.

Table YARD3-1 Rooms Located in Fire Area YARD3	
ROOM #	**DESCRIPTION**
SXFMR	Startup Transformer Area

There is no automatic fire suppression or detection installed in this area.

2.0 PRIMARY EQUIPMENT USED FOR PFSSD

Table YARD3-2 lists each system credited for post-fire safe shutdown and provides a discussion regarding the availability of the system to perform its Post Fire Safe Shutdown (PFSSD) function if a severe fire occurs in this area. For a summary of the potential fire impact on some of the more significant PFSSD equipment, see Section 8.0 of the Fire Area Analysis Narrative section.

Table YARD3-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area YARD3

System	System Name	PFSSD Function*	Comments
AB	Main Steam	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
AC	Main Turbine	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
AE	Main Feedwater	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
AL	Aux. Feedwater System	H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
AP	Condensate Storage System	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
BB	Reactor Coolant System	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
BG	Chemical and Volume Control System	R, M, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
BM	Steam Generator Blowdown System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
BN	Borated Refueling Water Storage System	R, M, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
EF	Essential Service Water System	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
EG	Component Cooling Water System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
EJ	Residual Heat Removal System	M, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
EM	High Pressure Coolant Injection	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
EN	Containment Spray	R, M	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3

Table YARD3-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area YARD3

System	System Name	PFSSD Function*	Comments
EP	Safety Injection Accumulators	H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
FB	Auxiliary Steam	R, H	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
FC	Auxiliary Turbines	R, H, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
GD	ESW Pump House HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
GF	AFW Pump Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
GK	Control Room and Class 1E Switchgear Room Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
GL	Auxiliary Building HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
GM	Emergency Diesel Generator Room HVAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
GN	Containment Coolers	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
JE	Diesel Fuel Oil	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
KA	Instrument Air	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
KC	Fire Protection	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
KH	Service Gas	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
KJ	Standby Diesel Engine	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
MA	Main Generation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
MR	Startup Transformer	S	A fire in this area could affect the startup transformer which provides off-site power to XNB02. The Train B EDG is available to power NB02.

Table YARD3-2
Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area YARD3

System	System Name	PFSSD Function*	Comments
NB	4.16 kV System	S	Off-site power to NB02 could be affected. The Train B EDG remains available to power NB02.
NE	Standby Diesel Generator	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
NF	Load Shed and Emergency Load Sequencing	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
NG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
NK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
NN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
PA	13.8kV	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
PB	4.16kV	H, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
PG	480V Load Centers and MCCs	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
PK	125VDC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
PL	Local Instrument Panels	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
PN	120VAC	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
QB	Standby AC Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
QD	Emergency Lighting	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
RL	Control Room MCB	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
RP	Miscellaneous Control Panels	R, M, H, P, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3

Table YARD3-2 Summary of Post Fire Safe Shutdown (PFSSD) Capability for Fire Area YARD3			
System	**System Name**	**PFSSD Function***	**Comments**
SA	ESFAS	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
SB	Reactor Protection System	R, S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
SC	Reactor Instrumentation	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
SE	Ex-Core Neutron Monitoring	R, P	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
SY	Switchyard	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3
UU	Supervisory System	S	The PFSSD function(s) associated with this system is(are) not affected by a fire in area YARD3

* R - Reactivity Control; M - Reactor Coolant Makeup; H - Decay Heat Removal; P - Process Monitoring; S - Support Function

3.0 ACTIONS TO ACHIEVE AND MAINTAIN PFSSD

This section describes operator actions that may need to be performed inside or outside the control room to achieve and maintain hot standby if a fire occurs in area YARD3. This section also describes cold shutdown repairs that may need to be made to achieve and maintain cold shutdown conditions. Operator actions are proceduralized in OFN KC-016.

3.1 ACTIONS OUTSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.2 ACTIONS INSIDE THE MCR TO ACHIEVE AND MAINTAIN HOT STANDBY

None

3.3 ACTIONS TO ACHIEVE AND MAINTAIN COLD SHUTDOWN

None

4.0 CONCLUSION

Post-fire safe shutdown is assured if a fire occurs in this fire area.

5.0 DETAILED ANALYSIS

This section describes the detailed component-by-component and cable-by-cable analysis for a fire in area YARD3.

5.1 PFSSD EQUIPMENT LOCATED IN FIRE AREA YARD3

PFSSD components (S. in E-15000) located in fire area YARD3 are shown in Table YARD3-3. An evaluation of each component and associated cables is provided in the sections that follow. The applicable evaluation section is listed in Table YARD3-3.

Table YARD3-3 PFSSD Equipment Located in Fire Area YARD3				
Room #	**PFSSD Equipment**	**Description**	**Evaluation Section**	**Comments**
YARD2	XMR01	Startup Transformer	5.1.1	

5.1.1 Startup Transformer Area

A fire in this area could affect the startup transformer. The startup transformer supplies off-site power to Train B Class 1E transformer XNB02. If a fire affects the startup transformer, the Train B emergency diesel generator is available to provide power to NB02. Therefore, post-fire safe shutdown is assured if a fire occurs in fire area YARD3.

References: E-15000, XX-E-013, KD-7496

5.2 PFSSD CABLE EVALUATION

There are no post-fire safe shutdown cables in fire area YARD3. The cables associated with the startup transformer are evaluated for impact on off-site power availability but are not considered essential to perform a PFSSD function.

IMAGED 11/17/2005

ATTACHMENT 1

INTEROFFICE CORRESPONDENCE

FROM

D. R. PRICHARD

DATED

JANUARY 10, 1996

WOLF CREEK
NUCLEAR OPERATING CORPORATION

INTEROFFICE CORRESPONDENCE

TO: TE 43512

FROM: D. R. Prichard

DATE: January 10, 1996

SUBJECT: Loss of CCW Cooling to CCP Lube Oil Heat Exchangers

Reference:
1. SA-92-048 Rev. 0, "Human Reliability Analysis for WCGS PRA
2. CKL ZL-001 Rev. 33, "Auxiliary Building Reading Sheets"

The PRA model, as currently configured, contains a dependency between the CCPs and the availability of CCW cooling to the CCP lube oil system. Upon a loss of CCW cooling, it is assumed that the operator must trip the CCPs within 30 minutes to avoid overheating the lube oil and consequentially failing the pumps. This best estimate analysis was performed to determine the amount of time actually available before the lube oil overheats to a level which could cause pump failure.

The following assumptions were used:

1. A lube oil temperature of 180°F at the outlet of the outboard bearing is assumed to cause bearing, and hence pump, failure. This value comes from the Aux Building Reading Sheets, wherein the watchstander is required to notify the control room if the bearing oil outlet temperature is equal to or greater than 180°F.

2. Typically, based on discussions with the CCP System Engineer, the temperature of the outboard bearing oil is about 15 degrees F higher than the oil temperature at the outlet of the heat exchanger.

3. A typical initial condition for the outlet temperature of the lube oil at the heat exchanger is 80°F. This value is based on a conservative average value for measurements taken by the System Engineer in December (64.5°F) and July (90°F). For example, (64.5+90) / 2 = 77.25. Therefore, 80°F is a realistic approximation.

4. The typical CCW delta-T across the lube oil heat exchanger is about 2 degrees F. Again, this is based on System Engineer readings. Based on a typical CCW flow of 30,000 lbm/hr, this equates to a heat transfer into the CCW water of 60,000 BTU/hr. This number is reasonable, considering the heat exchanger is designed to transfer up to 75,000 BTU/hr.

5. The specific heat of the lube oil is 0.47.

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6. The amount of lube oil in the system is 595 lb based on 85 gallons of oil and an estimated weight of 7 lb/gal.

If the CCW flow is lost to the lube oil heat exchanger, the 60,000 BTU/hr that would have been removed from the lube oil via CCW flow is now assumed to remain entirely in the lube oil. Using the following equation, the temperature rise of the lube oil can be determined:

Q = (m) (Cp) (delta-T), where

Q = heat in BTU added to the lube oil
m = mass of lube oil in the system in lbm
Cp = the specific heat of the lube oil, 0.47
delta-T = the change in the oil temperature in degrees F

delta-T = (Q) / (m) (Cp), or
= 60,000 / (0.47) (595)
= 215 degrees F / hour

The maximum allowed temperature at the outboard thrust bearing is 180°F and the assumed initial temperature is 80°F, so a temperature difference of 100 degrees F is the maximum allowed. The time to reach 180°F is (100 / 215) * 60 minutes = 28 minutes. This 28 minutes assumes that the entire heat normally transferred to the CCW water stays in the lube oil. In actuality, as the lube oil temperature rises above its normal temperature, an increasing amount of heat energy will be transferred to the surrounding air through the piping, reservoir walls, etc. Therefore, it appears the 30 minutes previously allowed for the operator action was a reasonable estimate.

Dan Pritchard

DRP/pb

cc: V.D. Luckert (GB-NE)
J. D. Stamm (GB-NE)

Attachment 2

Embedded Conduit Evaluation

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1.0 PURPOSE

The purpose of this Attachment is to evaluate embedded conduit that contains Post-Fire Safe Shutdown (PFSSD) related cables.

2.0 SCOPE

All embedded conduit containing PFSSD cables will be evaluated in this attachment, regardless of whether the cable is required for PFSSD in the event of a fire in an adjacent fire area.

3.0 ASSUMPTIONS

The heat sink effect of the concrete is ignored. In reality, the heat transfer through the wall or floor will be much slower than the indicated fire resistance ratings due to the thermal mass of the walls and floors. Therefore, this assumption is conservative.

4.0 REFERENCES

4.1 BASIC REFERENCES

4.1.1 NFPA 5000, Building Construction and Safety Code, 2006 Edition

4.1.2 ACI 216.1-07 / TMS-0216-07, Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies

4.1.3 ASTM E-119-00a, Standard Test Methods for Fire Tests of Building Construction and Materials

4.2 NUCLEAR REGULATORY COMMISSION DOCUMENTS

4.2.1 NRC Generic Letter 86-10, Implementation of Fire Protection Requirements, and Supplement 1 to GL 86-10

4.3 WOLF CREEK DRAWINGS

4.3.1 A-1801 – Fire Delineation Floor Plan El. 1974-0

4.3.2 A-1802 – Fire Delineation Floor Plan El. 2000-0

4.3.3 A-1803 – Fire Delineation Floor Plan El. 2026-0

4.3.4 C-1C1112 - Auxiliary Building Area 1 Neat Line Base Slab El. 1974-0

4.3.5 C-1C1122 - Auxiliary Building Area 2 Neat Line Base Slab El. 1974-0

4.3.6 C-1C3311 – Control Building Area 1 Neat Line Floor El. 2000-0

4.3.7 C-1C3411 – Control Building Area 1 Concrete Neat Line & Reinforcing Plan Floor El. 2016-0

4.3.8 C-0C3511 – Control Building Area 1 Neat Line Floor El. 2032-0

4.3.9 E-0R1112 - Embedded Conduit Auxiliary Building Area 1 El. 1974-0

4.3.10 E-1R1122 – Embedded Conduit Auxiliary Building Area 2 El. 1974-0

4.3.11 E-1R1142 – Embedded Conduit Auxiliary Building Area 4 El. 1974-0

4.3.12 E-1R1153 – Exposed Conduit Area 5 Auxiliary Building El. 1974-0 & El. 1989-0

4.3.13 E-0R1322 – Embedded Conduit Auxiliary Building Area 2 El. 2000-0

4.3.14 E-1R1351 – Raceway Plan Area 5 Auxiliary Building El. 1974-0, 1989-0, 2000-0, 2013-6

4.3.15 E-0R1412 – Embedded Conduit Auxiliary Building Area 1 El. 2026-0

4.3.16 E-0R1422 – Embedded Conduit Auxiliary Building Area 2 El. 2026-0

4.3.17 E-1R3211 – Raceway Plan Control Building Area 1 El. 1984-0

4.3.18 E-1R3311 – Raceway Plan Control Building Area 1 El. 1984-0

4.3.19 E-1R5111 – Embedded Conduit Plan Diesel Generator Building El. 2000-0

4.3.20 E-1R1904 – Raceway Sections & Details Auxiliary Building

4.3.21 E-0R1905 – Raceway Sections & Details Auxiliary Building

4.3.22 E-0R1906 – Raceway Sections & Details Auxiliary Building

4.4 WOLF CREEK SPECIFICATIONS

4.4.1 C-101 – Technical Specification for Contract for Providing Onsite Batch Plant and Furnishing Concrete for the Wolf Creek Generating Station

5.0 EVALUATION

This section provides an analysis of embedded conduit at Wolf Creek to determine if the depth of concrete embedment provides sufficient protection against a design basis exposure fire for embedded conduits carrying PFSSD cables.

Fire rating of reinforced concrete was researched to determine the minimum embedment depth required to achieve the desired fire resistance rating. Fire resistance of concrete walls and ceilings is evaluated using the testing methods specified in ASTM E-119 (Reference 4.1.3). The acceptance criteria in ASTM E-119 states that the temperature rise on the unexposed side of the fire barrier cannot exceed 250 F when averaged among all thermocouples. Table 1 identifies the minimum concrete thickness required to ensure a temperature rise equal to or below 250 F for various types of aggregate and different fire ratings.

NRC Generic Letter 86-10 (Reference 4.2.1) provides acceptance criteria for fire barriers used to separate redundant PFSSD cables. The acceptance criteria requires that the maximum temperature rise does not exceed 250 F, which is the same as that used for fire barriers in ASTM E-119. Generic Letter 86-10 also states that if the temperature rise does not exceed 250 F, then cables on the unexposed side of the barrier are considered free of fire damage.

ACI 216.1-07 (Reference 4.1.2) provides hourly fire resistance ratings for concrete based on barrier thickness and aggregate type used. Table 1 is taken from Reference 4.1.2, Table 2.1, and summarizes the concrete thickness required to meet desired fire resistance ratings.

Wolf Creek specification C-101 (Reference 4.4.1) identifies the aggregate used at Wolf Creek is consistent with siliceous. This aggregate type also results in the most conservative fire resistance rating identified in Table 1. Therefore, to meet the 1 hour fire rating requirements a minimum embedment of 3.5 inches is required and to meet the 3 hour fire rating requirements a minimum embedment of 6.2 inches is required.

Table 1 – Fire Resistance of Single Layer Concrete Walls, Floors and Roofs (Reference 4.1.2, Table 2.1)					
Aggregate Type	**Minimum equivalent thickness for fire-resistance rating, inches**				
	1 hour	**1-1/2 hours**	**2-hours**	**3 hours**	**4 hours**
Siliceous	3.5	4.3	5.0	6.2	7.0
Carbonate	3.2	4.0	4.6	5.7	6.6
Semi-lightweight	2.7	3.3	3.8	4.6	5.4
Lightweight	2.5	3.1	3.6	4.4	5.1

Table 2 identifies each embedded conduit that carries PFSSD cables and identifies some key attributes of those conduits. Those key attributes are described as follows:

Conduit # - The embedded conduit under consideration.

PFSSD Cables Included – The PFSSD related cables that are run in the embedded conduit under consideration.

From Room (Fire Area) – The room and fire area at one of the endpoints for the embedded conduit under consideration.

To Room (Fire Area) – The room and fire area at one of the endpoints for the embedded conduit under consideration.

Cable Function – The function of the PFSSD cable included in the embedded conduit under consideration.

Conduit OD (inches) – The outside diameter of the embedded conduit under consideration.

Adjacent Fire Areas – Fire areas that the embedded conduit passes without terminating in the area.

Required Rating – This is the hourly fire rating required if the embedded conduit contains redundant circuits to those in the adjacent fire areas. If the adjacent fire area contains automatic fire suppression and detection, then the required rating is 1 hour. If the adjacent fire area does not contain automatic fire suppression and detection, then the required rating is 3 hours.

Required Concrete Cover – This is the required depth of coverage to the outer most edge of the conduit based on the required rating and Table 1.

Min Actual Concrete Cover – This is the minimum embedment depth along the length of the embedded conduit based on reference drawings.

The embedded conduit drawings identify the bury depth to the centerline of each embedded conduit. Using the conduit OD and the bury depth, the distance from the face of the wall to the outside edge of the conduit can be determined. This distance must be equal to or greater than the minimum depth indicated in Table 1. Table 2 provides a summary of the results of this evaluation.

6.0 CONCLUSIONS

Based on the information contained in Table 2, the depth of concrete embedment for each conduit carrying PFSSD cables provides sufficient fire resistance for the desired hourly fire rating. Therefore, the cables will remain free of fire damage in the event of a fire in any of the adjacent fire areas.

Table 2 – Summary of Embedded Conduit Containing PFSSD Cables

Conduit #	PFSSD Cables Included	From Room (Fire Area)	To Room (Fire Area)	Cable Function	Conduit OD (inches)	Adjacent Fire Areas	Required Rating	Required Concrete Cover	Min Actual Concrete Cover
111B1E1F	11EGB01AA	3301 (C-9)	1403 (A-27)	Power for DPEG01A	4.5	A-8, C-16, C-21	1 hr	3.5”	15.75”
111B1E1G	11EGB01CA	3301 (C-9)	1403 (A-27)	Power for DPEG01C	4.5	A-8, C-16, C-21	1 hr	3.5”	15.75”
111B2B1A	11EJB01AA	NAC (C-5)	1111 (A-2)	Power for DPEJ01A	4.5	A-1, C-1	1 hr	3.5”	6.75”
111B2E1D	11BGB01AA	NAC (C-5)	1114 (A-2)	Power for DPBG05A	4.5	A-1, C-1	1 hr	3.5”	6.75”
111B2F1E	11ALB01AA	NAC (C-5)	1128 (A-1)	Power for DPAL01A	4.5	A-3, A-6, A-7, C-1	1 hr (C-1) 3 hr (A-3, A-6, A-7)	3.5” 6.2”	6.75” (C-1) 40.75” (A-3, A-6, A-7)
111B2F1H	11ALB01AA	1206 (A-33)	1326 (A-14)	Power for DPAL01A	4.5	N/A	N/A	N/A	N/A
111B2F1J	11ALB01AA	1128 (A-1)	1206 (A-33)	Power for DPAL01A	4.5	N/A	N/A	N/A	N/A
111G1B1A	11NGG01BE	3301 (C-9)	5203 (D-1)	Power to NG03D	4.5	A-8, C-1, C-10, C-11, C-36	1 hr	3.5”	15.75”
111G1B1B	11NGG01BD	3301 (C-9)	5203 (D-1)	Power to NG03D	4.5	A-8, C-1, C-10, C-11, C-36	1 hr	3.5”	15.75”
111U1001	11KJK01AA 11NEB01AK 11NEB01AL 11NEB01AV 11NEB10AB 11NEB10AC 11NEB10AG 11NEB10AJ 11NEK12AA	3301 (C-9)	5203 (D-1)	Power and control for Train A EDG	4.5	A-8, C-1, C-10, C-11, C-36	1 hr	3.5”	6.75”

Table 2 – Summary of Embedded Conduit Containing PFSSD Cables

Conduit #	PFSSD Cables Included	From Room (Fire Area)	To Room (Fire Area)	Cable Function	Conduit OD (inches)	Adjacent Fire Areas	Required Rating	Required Concrete Cover	Min Actual Concrete Cover
111U1004	11GMG01AH	3301 (C-9)	5203 (D-1)	Power to Train A EDG Room Supply Fan	4.5	A-8, C-1, C-10, C-11, C-36	1 hr	3.5”	15.75”
114B1J1F	14EGB01BA	3302 (C-10)	1401 (A-16S)	Power to DPEG01B	4.5	A-8, A-27, C-1, C-15, C-21, C-23	1 hr	3.5”	6.75”
114B1J1G	14EGB01DA	3302 (C-10)	1401 (A-16S)	Power to DPEG01D	4.5	A-8, A-27, C-1, C-15, C-21, C-23	1 hr	3.5”	6.75”
114B2C1B	14EJB01BA	SAC (C-6)	1109 (A-4)	Power to DPEJ01B	4.5	A-1, C-1	1 hr	3.5”	6.75”
114B2E1D	14BGB01BA	SAC (C-6)	1107 (A-4)	Power to DPBG05B	4.5	A-1, C-1, C-3	1 hr	3.5”	6.75”
114B2F1E	14ALB01BA	SAC (C-6)	1128 (A-1)	Power for DPAL01B	4.5	A-2, C-1	1 hr (C-1) 3 hr (A-2)	3.5” 6.2”	6.75” (C-1) 44.75” (A-2)
114B2F1K	14ALB01BA	1206 (A-33)	1325 (A-13)	Power for DPAL01B	4.5	None	N/A	N/A	N/A
114B2F1S	14ALB01BA	1128 (A-1)	1206 (A-33)	Power for DPAL01B	4.5	None	N/A	N/A	N/A
115A1C1B	15PGG02AB	3503 (CC-1)	1301 (A-8)	Power to PG19G	5.5	A-27, C-1, C-24, C-25, C-26	1 hr	3.5”	6.25”
151B5001	11NEB01AF	5203 (D-1)	5203 (D-1)	Phase C power from Train A EDG	4.5	None	N/A	N/A	N/A
151B5002	11NEB01AS	5203 (D-1)	5203 (D-1)	Phase C power from Train A EDG	4.5	None	N/A	N/A	N/A

Table 2 – Summary of Embedded Conduit Containing PFSSD Cables

Conduit #	PFSSD Cables Included	From Room (Fire Area)	To Room (Fire Area)	Cable Function	Conduit OD (inches)	Adjacent Fire Areas	Required Rating	Required Concrete Cover	Min Actual Concrete Cover
151B5003	11NEB01AD	5203 (D-1)	5203 (D-1)	Phase B power from Train A EDG	4.5	None	N/A	N/A	N/A
151B5004	11NEB01AP	5203 (D-1)	5203 (D-1)	Phase B power from Train A EDG	4.5	None	N/A	N/A	N/A
151B5005	11NEB01AB	5203 (D-1)	5203 (D-1)	Phase A power from Train A EDG	4.5	None	N/A	N/A	N/A
151B5006	11NEB01AJ	5203 (D-1)	5203 (D-1)	Phase A power from Train A EDG	4.5	None	N/A	N/A	N/A
151B5008	11NEB01AH	5203 (D-1)	5203 (D-1)	Train A EDG control	2.375	None	N/A	N/A	N/A
151J5001	11KJK06AC 11KJK06AF	5203 (D-1)	5203 (D-1)	Train A EDG control	4.5	None	N/A	N/A	N/A
151J5004	11KJK01AM	5203 (D-1)	5203 (D-1)	Train A EDG control	4.5	None	N/A	N/A	N/A
151U5002	11NEB01AQ 11NEB01AT	5203 (D-1)	5203 (D-1)	Train A EDG control	4.5	None	N/A	N/A	N/A
151U5003	11KJK01AF	5203 (D-1)	5203 (D-1)	Train A EDG control	4.5	None	N/A	N/A	N/A
151U5005	11NEB01AR 11NEB01AU	5203 (D-1)	5203 (D-1)	Train A EDG control	4.5	None	N/A	N/A	N/A
154B5001	14NEB02AF	5201 (D-2)	5201 (D-2)	Phase C power from Train B EDG	4.5	None	N/A	N/A	N/A
154B5002	14NEB02AU	5201 (D-2)	5201 (D-2)	Phase C power from Train B EDG	4.5	None	N/A	N/A	N/A

Table 2 – Summary of Embedded Conduit Containing PFSSD Cables

Conduit #	PFSSD Cables Included	From Room (Fire Area)	To Room (Fire Area)	Cable Function	Conduit OD (inches)	Adjacent Fire Areas	Required Rating	Required Concrete Cover	Min Actual Concrete Cover
154B5003	14NEB02AE	5201 (D-2)	5201 (D-2)	Phase B power from Train B EDG	4.5	None	N/A	N/A	N/A
154B5004	14NEB02AS	5201 (D-2)	5201 (D-2)	Phase B power from Train B EDG	4.5	None	N/A	N/A	N/A
154B5005	14NEB02AD	5201 (D-2)	5201 (D-2)	Phase A power from Train B EDG	4.5	None	N/A	N/A	N/A
154B5006	14NEB02AR	5201 (D-2)	5201 (D-2)	Phase A power from Train B EDG	4.5	None	N/A	N/A	N/A
154B5008	14NEB02AQ	5201 (D-2)	5201 (D-2)	Train B EDG control	2.375	None	N/A	N/A	N/A
154J5001	14KJK07AC 14KJK07AF	5201 (D-2)	5201 (D-2)	Train B EDG control	4.5	None	N/A	N/A	N/A
154J5004	14KJK03AM	5201 (D-2)	5201 (D-2)	Train B EDG control	4.5	None	N/A	N/A	N/A
154U5002	14NEB02AG 14NEB02AH	5201 (D-2)	5201 (D-2)	Train B EDG control	4.5	None	N/A	N/A	N/A
154U5003	14KJK03AF	5201 (D-2)	5201 (D-2)	Train B EDG control	4.5	None	N/A	N/A	N/A
154U5005	14NEB02AJ 14NEB02AN	5201 (D-2)	5201 (D-2)	Train B EDG control	4.5	None	N/A	N/A	N/A

Attachment 3

Evaluation of Instrument Tubing Sensing Lines

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1.0 PURPOSE

The purpose of this evaluation is to determine if fire exposure to instrument tubing associated with post-fire safe shutdown (PFSSD) equipment will adversely impact the ability to achieve and maintain safe shutdown after a fire.

2.0 SCOPE

The scope of this review includes any type of tubing (i.e., copper, brass, stainless steel or capillary) that is directly connected to a transmitter required for PFSSD and that transmitter either provides a signal to an indicator in the control room or provides an actuation signal that can adversely impact PFSSD or both. This evaluation does not look at instrument air, since loss of instrument air will have no adverse impact on the PFSSD analysis. The instrument air system is not analyzed in the PFSSD analysis and is assumed to fail in the worse possible configuration.

3.0 ASSUMPTIONS

3.1 A fire in an area containing instrument tubing associated with PFSSD equipment is assumed to fail the associated transmitter to the worse possible state.

4.0 METHODOLOGY

The location of the instrument tubing was compared with the cable routing and the transmitter location to determine if the PFSSD analysis is potentially affected. If the tubing is located only in areas where the cables are run, then the effects of fire exposure to the tubing will not adversely impact the PFSSD analysis because the analysis already assumes worse case effects in the event the cable is damaged. If the tubing runs in areas where the cables are not located, then the PFSSD analysis will be reviewed to determine the impact on the analysis assuming worse case effect of fire exposure on the tubing.

5.0 EVALUATION

Fire exposure to instrument tubing can have the same effect as fire exposure to cables, where the transmitter can provide a spurious reading that results in spurious operation or mal-operation of required PFSSD equipment. Fire exposure can also result in false readings on indicators in the control room, preventing operators from accurately diagnosing plant conditions.

The difference between fire exposure to cables and fire exposure to instrument tubing is that cable damage will occur if the fire reaches approximately 700°F and the damage will need to be repaired before the associated equipment can be returned to operation. Instrument tubing at Wolf Creek is stainless steel which has a melting point of 2,750°F. The design basis ASTM E-119 fire exposure reaches a temperature of 1,925°F. Therefore, fire exposure to instrument tubing would not cause failure of the tubing and may have a short term effect on the instrument readings but will return to normal whenever the fire is extinguished.

NEI 00-01, Section 3.2.2.3 states the following regarding instrument tubing:

> *Identify instrument tubing that may cause subsequent effects on instrument readings or signals as a result of fire. Determine and consider the fire area location of the instrument tubing when evaluating the effects of fire damage to circuits and equipment in the fire area.*

NEI 00-01, Section 3.4.1.9 states the following regarding instrument tubing:

> *Consider the effects of the fire on the density of the fluid in instrument tubing and any subsequent effects on instrument readings or signals associated with the protected safe*

shutdown path in evaluating post-fire safe shutdown capability. This can be done systematically or via procedures such as Emergency Operating Procedures.

Table 1 lists all PFSSD credited transmitters. This list was developed from XX-E-013, Rev. 2, Appendix 3. The table also provides a description of the transmitter, the room and fire area where the transmitter is located, the instrument cable associated with the transmitter, the fire areas where the cable is located and the fire areas where the instrument tubing is located. In addition, the table indicates whether there are any potential adverse impacts that have not been analyzed in the PFSSD analysis, comments related to the instrument and references.

Table 1
Instrument Tubing Evaluation for PFSSD Credited Instruments

Component ID	Description	Room	Fire Area	Cable	Cable Location	Instrument Tube Location	Potential Adverse PFSSD Impact?	Comments	References
ABPT0001	Stm Gen A Steamline Pressure Transmitter	1304	A-29	11ABI20EA	A-6, A-8, A-13, A-14, A-29, C-18, C-21, C-24	A-23W, A-29	No	Note 4	J-14AB01
ABPT0002	Stm Gen B Steamline Pressure Transmitter	1305	A-30	12ABI20FH	A-13, A-16N, A-18, A-24, A-27, A-29, A-30, C-10, C-20, C-25, C-36	A-23E, A-30	No	Note 5	J-04AB02
ABPT0003	Stm Gen C Steamline Pressure Transmitter	1305	A-30	13ABI20GA	A-8, A-16N, A-24, A-27, A-29, A-30, C-21, C-26	A-23E, A-30	No	Note 6	J-04AB03
ABPT0004	Stm Gen D Steamline Pressure Transmitter	1304	A-29	14ABI20HH	A-6, A-13, A-16N, A-18, A-21, A-24, A-29, C-10, C-11, C-17, C-23, C-30	A-23W, A-29	No	Note 7	J-04AB04
ABPT0514	Stm Gen A Steamline Pressure Transmitter	1411	A-23	11ABI21JA	A-6, A-8, A-13, A-14, A-23W, A-29, C-18, C-21, C-24	A-23W	No	Note 3	J-04AB28
ABPT0515	Stm Gen A Steamline Pressure Transmitter	1411	A-23	12ABI21KA	A-13, A-16N, A-18, A-23W, A-24, A-27, C-25, C-32	A-23W	No	Note 3	J-04AB29
ABPT0516	Stm Gen A Steamline Pressure Transmitter	1411	A-23	14ABI21LA	A-6, A-13, A-16N, A-18, A-21, A-23W, A-24, C-22, C-30, C-33	A-23W	No	Note 3	J-04AB30
ABPT0524	Stm Gen B Steamline Pressure Transmitter	1412	A-23	11ABI21MA	A-6, A-8, A-14, A-15, A-23E, C-18, C-21, C-24	A-23E	No	Note 3	J-04AB05
ABPT0525	Stm Gen B Steamline Pressure Transmitter	1412	A-23	12ABI21NA	A-13, A-15, A-16N, A-18, A-23E, A-24, A-27, C-25, C-32	A-23E	No	Note 3	J-04AB06
ABPT0526	Stm Gen B Steamline Pressure Transmitter	1412	A-23	13ABI21PA	A-8, A-16N, A-23E, A-24, A-27, A-29, A-30, C-21, C-26	A-23E	No	Note 3	J-04AB07

Table 1
Instrument Tubing Evaluation for PFSSD Credited Instruments

Component ID	Description	Room	Fire Area	Cable	Cable Location	Instrument Tube Location	Potential Adverse PFSSD Impact?	Comments	References
ABPT0534	Stm Gen C Steamline Pressure Transmitter	1412	A-23	11ABI21RA	A-6, A-8, A-14, A-15, A-23E, C-18, C-21, C-24	A-23E	No	Note 3	J-14AB14
ABPT0535	Stm Gen C Steamline Pressure Transmitter	1412	A-23	12ABI21SA	A-13, A-15, A-16N, A-18, A-23E, A-24, A-27, C-25, C-32	A-23E	No	Note 3	J-04AB15
ABPT0536	Stm Gen C Steamline Pressure Transmitter	1412	A-23	13ABI21TA	A-8, A-16N, A-23E, A-24, A-27, A-29, A-30, C-21, C-26	A-23E	No	Note 3	J-14AB16
ABPT0544	Stm Gen D Steamline Pressure Transmitter	1411	A-23	11ABI21UA	A-6, A-8, A-13, A-14, A-23W, A-29, C-18, C-21, C-24	A-23W	No	Note 3	J-04AB31
ABPT0545	Stm Gen D Steamline Pressure Transmitter	1411	A-23	12ABI21VA	A-13, A-16N, A-18, A-23W, A-24, A-27, C-25, C-32	A-23W	No	Note 3	J-04AB32
ABPT0546	Stm Gen D Steamline Pressure Transmitter	1411	A-23	14ABI21WA	A-6, A-13, A-16N, A-18, A-21, A-23W, A-24, C-22, C-30, C-33	A-23W	No	Note 3	J-04AB33
AELT0501	Steam Generator A Wide Range Water Level	RB2	RB-2	11AEI08AA (Note 1)	RB-2, RB-3	RB-1, RB-2, RB-6, RB-10	Yes	Evaluation 5	J-14AB08 J-14AE32 J-14AE35 M-13AE09
AELT0502	Steam Generator B Wide Range Water Level	RB2	RB-2	12AEI08GA (Note 1)	RB-2, RB-4	RB-1, RB-2, RB-8, RB-10	Yes	Evaluation 5	J-14AB11 J-14AE04 M-13AE09
AELT0503	Steam Generator C Wide Range Water Level	RB2	RB-2	13AEI08GA (Note 1)	RB-2, RB-3	RB-1, RB-2, RB-8, RB-10	Yes	Evaluation 5	J-04AE29 M-13AE09
AELT0504	Steam Generator D Wide Range Water Level	RB2	RB-2	14AEI08LA (Note 1)	RB-2, RB-4, RB-7	RB-1, RB-2, RB-6, RB-7, RB-10	Yes	Evaluation 5	J-14AE30 M-13AE09
AELT0517	Steam Generator A Narrow Range Water Level	RB7	RB-7	14AEI08NA (Note 1)	RB-2, RB-4, RB-7	RB-1, RB-6, RB-7, RB-10	Yes	Evaluation 5	J-14AE31 M-13AE09
AELT0518	Steam Generator A Narrow Range Water Level	RB7	RB-7	13AEI08HA (Note 1)	RB-2, RB-3, RB-7	RB-1, RB-6, RB-7, RB-10	Yes	Evaluation 5	J-14AE35 M-13AE09
AELT0519	Steam Generator A Narrow Range Water Level	RB7	RB-7	12AEI08EA (Note 1)	RB-2, RB-4, RB-7	RB-1, RB-6, RB-7, RB-10	Yes	Evaluation 5	J-14AB08 J-14AE32 M-13AE09
AELT0527	Steam Generator B Narrow Range Water Level	RB8	RB-8	14AEI08PA (Note 1)	RB-2, RB-4, RB-8	RB-1, RB-8, RB-10	Yes	Evaluation 5	J-14AE34 M-13AE09

Table 1
Instrument Tubing Evaluation for PFSSD Credited Instruments

Component ID	Description	Room	Fire Area	Cable	Cable Location	Instrument Tube Location	Potential Adverse PFSSD Impact?	Comments	References
AELT0528	Steam Generator B Narrow Range Water Level	RB8	RB-8	13AEI08JA (Note 1)	RB-2, RB-3, RB-7, RB-8	RB-1, RB-8, RB-10	Yes	Evaluation 5	J-14AE34 M-13AE09
AELT0529	Steam Generator B Narrow Range Water Level	RB8	RB-8	11AEI08BA (Note 1)	RB-2, RB-3, RB-8	RB-1, RB-8, RB-10	Yes	Evaluation 5	J-14AB10 M-13AE09
AELT0537	Steam Generator C Narrow Range Water Level	RB8	RB-8	14AEI08QA (Note 1)	RB-2, RB-4, RB-8	RB-1, RB-8, RB-10	Yes	Evaluation 5	J-14AE37 M-13AE09
AELT0538	Steam Generator C Narrow Range Water Level	RB8	RB-8	13AEI08KA (Note 1)	RB-2, RB-3, RB-8	RB-1, RB-8, RB-10	Yes	Evaluation 5	J-14AE29 M-13AE09
AELT0539	Steam Generator C Narrow Range Water Level	RB8	RB-8	11AEI08CA (Note 1)	RB-2, RB-3, RB-8	RB-1, RB-8, RB-10	Yes	Evaluation 5	J-14AB12 M-13AE09
AELT0547	Steam Generator D Narrow Range Water Level	RB4	RB-4	14AEI08RA (Note 1)	RB-4	RB-1, RB-4, RB-7, RB-10	Yes	Evaluation 5	J-14AE30 M-13AE09
AELT0548	Steam Generator D Narrow Range Water Level	RB7	RB-7	13AEI08LA (Note 1)	RB-3, RB-7	RB-1, RB-4, RB-7, RB-10	Yes	Evaluation 5	J-14AE41 M-13AE09
AELT0549	Steam Generator D Narrow Range Water Level	RB7	RB-7	12AEI08FA (Note 1)	RB-4, RB-7	RB-1, RB-4, RB-7, RB-10	Yes	Evaluation 5	J-04AB18 M-13AE09
AELT0551	Steam Generator A Narrow Range Water Level	RB3	RB-3	11AEI12AA (Note 1)	RB-3, RB-7	RB-1, RB-6, RB-7, RB-10	Yes	Evaluation 5	J-13AB08 J-13AE32 M-13AE09
AELT0552	Steam Generator B Narrow Range Water Level	RB8	RB-8	12AEI12BA (Note 1)	RB-2, RB-4, RB-8	RB-1, RB-8, RB-10	Yes	Evaluation 5	J-14AE04 M-13AE09
AELT0553	Steam Generator C Narrow Range Water Level	RB8	RB-8	12AEI12CA (Note 1)	RB-2, RB-4, RB-8	RB-1, RB-8, RB-10	Yes	Evaluation 5	J-04AB13 M-13AE09
AELT0554	Steam Generator D Narrow Range Water Level	RB4	RB-4	11AEI12DA (Note 1)	RB-3, RB-4, RB-5, RB-6, RB-10	RB-1, RB-4, RB-7, RB-10	Yes	Evaluation 5	J-14AB17 M-13AE09
ALFT0001	AFWP to Steam Generator D Flow Transmitter	1304	A-29	14ALI07AD	A-6, A-13, A-16N, A-18, A-21, A-24, A-29, C-10, C-11, C-17, C-23, C-30	A-29	No	Note 3	J-14AL01
ALFT0007	Aux Fdw Flow to Steam Generator A Flow Xmtr	1304	A-29	14ALI09AA	A-6, A-13, A-16N, A-18, A-21, A-24, A-29, C-22, C-30, C-33	A-29	No	Note 3	J-04AL23

Table 1
Instrument Tubing Evaluation for PFSSD Credited Instruments

Component ID	Description	Room	Fire Area	Cable	Cable Location	Instrument Tube Location	Potential Adverse PFSSD Impact?	Comments	References
ALFT0009	Aux Fdw Flow to Steam Generator B Flow Xmtr	1305	A-30	11ALI09BA	A-6, A-8, A-14, A-15, A-30, C-18, C-21, C-24	A-30	No	Note 3	J-04AL24
ALFT0011	Aux Fdw Flow to Steam Generator C Flow Xmtr	1305	A-30	11ALI09CA	A-6, A-8, A-14, A-15, A-30, C-18, C-21, C-24	A-30	No	Note 3	J-04AL25
ALPT0024	Mtr Driven AFW Pump PAL01B Suction Pressure	1325	A-13	14ALI07HD	A-6, A-13, A-16N, A-18, A-21, A-24, C-10, C-11, C-17, C-23, C-30	A-13	No	Note 3	J-14AL17
ALPT0025	Mtr Driven AFW Pump PAL01A Suction Pressure	1326	A-14	11ALI07JA	A-6, A-8, A-14, C-18, C-21, C-24	A-14	No	Note 3	J-04AL18
ALPT0026	TDAFW Pump PAL02 Suction Pressure	1331	A-15	12ALI07KD	A-13, A-15, A-16N, A-18, A-24, A-27, C-10, C-20, C-25, C-36	A-15	No	Note 3	J-04AL19
ALPT0037	ESFAS Low Suction Pressure	1207	A-33	11ALI08AA	A-6, A-8, A-14, A-15, A-30, A-33, C-18, C-21, C-24	A-33	No	Note 3	J-14AL20
ALPT0038	ESFAS Low Suction Pressure	1207	A-33	12ALI08BA	A-13, A-15, A-16N, A-18, A-24, A-27, A-30, A-33, C-22, C-25, C-32, C-34	A-33	No	Note 3	J-14AL21
ALPT0039	ESFAS Low Suction Pressure	1207	A-33	14ALI08CA	A-6, A-13, A-15, A-16N, A-18, A-21, A-24, A-30, A-33, C-22, C-30, C-33	A-33	No	Note 3	J-14AL22
BBFT0017	RCP A Thermal Barrier Cooler Flow Transmitter	RB3	RB3	11BBI28AB (Note 1)	RB-3	RB-3	No	Note 3	J-04BB35
BBFT0018	RCP B Thermal Barrier Cooler Flow Transmitter	RB2	RB2	11BBI28BB (Note 1)	RB-2, RB-3	RB-2	No	Note 3	J-04BB50
BBFT0019	RCP C Thermal Barrier Cooler Flow Transmitter	RB8	RB8	11BBI28CB (Note 1)	RB-2, RB-3, RB-8	RB-8	No	Note 3	J-14BB65
BBFT0020	RCP D Thermal Barrier Cooler Flow Transmitter	RB4	RB4	11BBI28DB (Note 1)	RB-3, RB-4, RB-10	RB-4	No	Note 3	J-14BB80
BBLT0459	Pressurizer Level Transmitter (Narrow Range)	RB4	RB-4	11BBI16PA (Note 1)	RB-3, RB-4, RB-5, RB-10	RB-1, RB-4, RB-10	Yes	Evaluation 1	J-14BB14

Table 1
Instrument Tubing Evaluation for PFSSD Credited Instruments

Component ID	Description	Room	Fire Area	Cable	Cable Location	Instrument Tube Location	Potential Adverse PFSSD Impact?	Comments	References
BBLT0460	Pressurizer Level Transmitter (Narrow Range)	RB4	RB-4	12BBI16QA (Note 1)	RB-4	RB-1, RB-4, RB-10	Yes	Evaluation 1	J-14BB15
BBPT0403	Reactor Coolant Sys Press Wide Range Hot Leg	1202	A-1	12BBI15NA 12BBI15NB	A-1, A-8, A-16N/S, A-17, A-25, A-27, C-25, C-32	A-1, A-25, RB-1, RB-2, RB-11	Yes	Evaluation 2	J-14BB02 J-14BB05 J-14BB08
BBPT0405	Reactor Coolant Sys Press Wide Range Hot Leg	1320	A-8	11BBI15EA 11BBI15EB	A-8, C-18, C-21, C-24	A-8, A-24, RB-1, RB-2, RB-11	Yes	Evaluation 2	J-14BB02 J-14BB03 J-14BB06
BBPT0406	Reactor Coolant Sys Press Wide Range Hot Leg	1202	A-1	14BBI16BA 14BBI16BB	A-1, A-12, A-16S, A-17, A-27, C-10, C-11, C-17, C-22, C-23, C-30, C-33	A-1, A-25, RB-1, RB-2, RB-11	Yes	Evaluation 2	J-14BB02 J-14BB05 J-14BB08
BBPT0455	Pressurizer Pressure Transmitter	RB4	RB-4	11BBI16KA (Note 1)	RB-3, RB-4, RB-5, RB-10	RB-4, RB-10	Yes	Evaluation 2	J-14BB14
BBPT0456	Pressurizer Pressure Transmitter	RB4	RB-4	12BBI16LA (Note 1)	RB-4	RB-4, RB-10	Yes	Evaluation 2	J-14BB15
BBPT0457	Pressurizer Pressure Transmitter	RB10	RB-10	13BBI16MA (Note 1)	RB-3, RB-4, RB-7, RB-10	RB-4, RB-10	Yes	Evaluation 2	J-14BB16
BBPT0458	Pressurizer Pressure Transmitter	RB10	RB-10	14BBI16NA (Note 1)	RB-4, RB-8, RB-10	RB-4, RB-10	Yes	Evaluation 2	J-14BB16
BGFT0215A	RCP Seal Injection Total Flow	1203	A-1	11BGI51AA	A-1, A-8, C-18, C-21, C-24	A-1	No	Note 3	J-04BG70
BGFT0215B	RCP Seal Injection Total Flow	1203	A-1	14BGI51BA	A-1, A-12, A-16S, A-17, A-27, C-22, C-23, C-30, C-33	A-1	No	Note 3	J-04BG71
BGLT0112	VCT Level Transmitter	1318	A-8	11BGI51CA	A-8, C-18, C-24, C-21	A-8	No	Note 3	J-14BG52
BGLT0185	VCT Level Transmitter	1316	A-34	14BGI51DA 14BGI51DB	A-8, A-16N, A-21, A-34, C-22, C-30, C-33	A-8, A-34	No	Note 3	J-14BG69
BNLT0930	RWST Level Transmitter	9102	RWST	11BNI07CA	A-19, A-20, A-22, C-21, C-24, C-31, F-1, F-2, F-5, F-7, RWST	RWST	No	Note 3	J-04BN03
BNLT0931	RWST Level Transmitter	9102	RWST	12BNI07DA	A-19, A-20, A-21, C-32, F-1, F-2, F-5, F-7, RWST	RWST	No	Note 3	J-14BN04

Table 1
Instrument Tubing Evaluation for PFSSD Credited Instruments

Component ID	Description	Room	Fire Area	Cable	Cable Location	Instrument Tube Location	Potential Adverse PFSSD Impact?	Comments	References
BNLT0932	RWST Level Transmitter	9102	RWST	13BNI07EB 13BNI07EC	A-19, A-20, A-22, F-2, F-5, F-7, RWST	RWST	No	Note 3	J-14BN05
BNLT0933	RWST Level Transmitter	9102	RWST	14BNI07FA	A-16S, A-17, A-27, C-22, C-23, C-30, C-33, F-2, F-4, F-5, RWST	RWST	No	Note 3	J-14BN06
EFFT0053	ESW A Flow to Power Block Flow Transmitter	3101	C-1	11EFI11EA	C-1, C-5, C-12, C-18, C-21, C-24	C-1	No	Note 3	J-14EF01
EFFT0054	ESW B Flow to Power Block Flow Transmitter	3101	C-1	14EFI11FA	C-1, C-6, C-11, C-17, C-22, C-23, C-30, C-33	C-1	No	Note 3	J-14EF02
EFPT0001	ESW Pump 1A Discharge Pressure Transmitter	K105	ESWA	11EFI08RB	C-5, C-12, C-18, C-21, C-24, ESWA	ESWA	No	Note 3	J-K4EF05
EFPT0002	ESW Pump 1B Discharge Pressure Transmitter	K104	ESWB	14EFI08RB	C-1, C-6, C-11, C-17, C-22, C-23, C-30, C-33, ESWB	ESWB	No	Note 3	J-K4EF06
EGFT0062	CCW Return from RCP Thermal Barrier Flow Transmitter	1127	A-6	14EGI15AA	A-6, A-16N, A-21, C-22, C-30, C-33	A-6, A-24	Yes	Evaluation 4	J-14EG23
EGFT0128	CCW HX To RCP Flow	1320	A-8	11EGI19AB	A-8, C-18, C-21, C-24	A-8, A-24	Yes	Evaluation 6	J-14EG49
EGFT0129	CCW HX To RCP Flow	1320	A-8	14EGI19BB	A-8, A-16N, A-21, C-22, C-30, C-33	A-8, A-24	Yes	Evaluation 6	J-14EG49
EGPT0077	CCW Pumps A & C Discharge Pressure Transmitter	1406	A-16	11EGI13AA	A-16N, A-19, A-22, C-21, C-24, C-31	A-16N	No	Note 3	J-04EG21
EGPT0078	CCW Pumps B & D Discharge Pressure Transmitter	1401	A-16	14EGI13BA	A-16S, A-27, C-22, C-23, C-30, C-33	A-16S	No	Note 3	J-04EG22
EJFIS0610	RHR Pump A Mini Flow Indicating Switch	1301	A-8	11EJG08AD	A-8, C-9, C-12, C-18	A-8, A-10	Yes	Evaluation 7	J-14EJ05
EJFIS0611	RHR Pump B Mini Flow Indicating Switch	1107	A-4	14EJG08BF	A-1, A-4, C-1, C-10, C-11	A-1, A-4, A-9	Yes	Evaluation 7	J-14EJ06
GNPT0934	Containment Pressure Transmitter	1409	A-17	14GNI05DA	A-17, A-19, A-20, A-21, C-22, C-30, C-33	A-17, RB-4	Yes	Evaluation 3	J-14GN01

Table 1
Instrument Tubing Evaluation for PFSSD Credited Instruments

Component ID	Description	Room	Fire Area	Cable	Cable Location	Instrument Tube Location	Potential Adverse PFSSD Impact?	Comments	References
GNPT0935	Containment Pressure Transmitter	1410	A-18	13GNI05CA	A-16N, A-18, A-27, C-21, C-26	A-18, RB-3	Yes	Evaluation 3	J-14GN01
GNPT0936	Containment Pressure Transmitter	1409	A-17	12GNI05BA	A-16N/S, A-17, A-25, A-27, C-25, C-32	A-17, RB-4	Yes	Evaluation 3	J-14GN01
GNPT0937	Containment Pressure Transmitter	1410	A-18	11GNI05AA	A-8, A-11, A-18, C-18, C-21, C-24	A-18, RB-3	Yes	Evaluation 3	J-14GN01

Notes

1. Cable listed is within containment. Other cable for this instrument runs outside containment. However, since the instrument tubing is only in containment, the other cables are not listed.
2. Deleted
3. All instrument tubing is run in areas where cables are located. Therefore, the PFSSD analysis in E-1F9910 is not affected.
4. ABPT0001 supplies the signal for ARV ABPV0001. ARV ABPV0001 is in fire area A-23W and has been analyzed in the PFSSD analysis assuming worse case spurious operation. The effects of fire exposure to the instrument tubing for ABPT0001 in fire area A-23 is bounded by the A-23 fire area analysis.
5. ABPT0002 supplies the signal for ARV ABPV0002. ARV ABPV0002 is in fire area A-23E and has been analyzed in the PFSSD analysis assuming worse case spurious operation. The effects of fire exposure to the instrument tubing for ABPT0002 in fire area A-23 is bounded by the A-23 fire area analysis.
6. ABPT0003 supplies the signal for ARV ABPV0003. ARV ABPV0003 is in fire area A-23E and has been analyzed in the PFSSD analysis assuming worse case spurious operation. The effects of fire exposure to the instrument tubing for ABPT0003 in fire area A-23 is bounded by the A-23 fire area analysis.
7. ABPT0004 supplies the signal for ARV ABPV0004. ARV ABPV0004 is in fire area A-23W and has been analyzed in the PFSSD analysis assuming worse case spurious operation. The effects of fire exposure to the instrument tubing for ABPT0004 in fire area A-23 is bounded by the A-23 fire area analysis.

<u>Evaluation 1</u>

At least one pressurizer level transmitter is required to be operable to provide operators with pressurizer level indication. Based on E-1F9910, at least one pressurizer level transmitter will remain operable when considering fire damage to the transmitters and/or associated cables. E-1F9910 did not consider fire effects on instrument tubing associated with the transmitters.

The PFSSD analysis credits pressurizer level transmitters BBLT0459 and BBLT0460. The fire area RB analysis in E-1F9910 also analyzes BBLT0461 and BBLT0462 because of the close proximity of all the pressurizer level transmitters.

A fire in the Reactor Building, areas RB-1, RB-4 and RB-10 could affect the instrument tubing for pressurizer level transmitters BBLT0459, BBLT0460, BBLT0461 and BBLT0462.

If the fire is in area RB-4 (South Electrical Penetration Area) the fire protection features provided (automatic fire detection and a manually charged closed head fire suppression system) meet the intent of the requirements of 10 CFR 50 Appendix R, Section III.G.2.e as discussed in the Wolf Creek SER. This protection coupled with the low fixed combustible loading and the strict control of transient combustibles in the containment during power operations provides reasonable assurance that a fire of sufficient magnitude to affect all four pressurizer level transmitters will not occur.

The instrument tubing for all four pressurizer level transmitters also runs in the pressurizer compartment which is part of fire areas RB-1 and RB-10. The only significant combustible loading within the pressurizer compartment are the heater cables. There are no significant ignition sources within the pressurizer compartment other than the energized heater cables. The heater elements are located inside the pressurizer and do not pose an ignition hazard within the pressurizer compartment. At the 2026-0 elevation around the pressurizer, cable trays carrying the pressurizer heater cables are provided with line-type heat detection. In the event of a fire, the heat detection will alarm in the control room on Window 139 (zone 203), prompting operator response. This protection coupled with the low fixed combustible loading and the strict control of transient combustibles in the containment during power operations provides reasonable assurance that a fire of sufficient magnitude to affect all four pressurizer level transmitters will not occur.

Level transmitters BBLT0459, 0460 and 0461 are Barton Model 764 Electronic Transmitters. Level transmitter BBLT0462 is a Barton Model 752 Electronic Transmitter. All four transmitters have built-in temperature compensation to adjust for changes in ambient temperature. The transmitters themselves are designed to operate for a limited period of time when subjected to adverse design-basis accident conditions within the containment, including high pressure, temperature and humidity. If the instrument tubing were exposed to a design basis fire with temperatures reaching 2000°F, the transmitter would likely fail to provide accurate level readings.

As stated earlier, the fire protection features provided in containment, the low fixed combustible loading, the lack of ignition sources in the areas where the instrument tubing runs and the strict control of transient combustible materials inside the containment provides reasonable assurance that a design basis fire will not occur. Any fire that does occur in containment will be limited in size and will likely not affect the accuracy of the pressurizer level transmitters. Therefore, the locations of the instrument tubing for the pressurizer level transmitters is acceptable.

<u>Evaluation 2</u>

Reactor coolant system (RCS) pressure indication is required for PFSSD to provide operators with indication of RCS pressure. Alternatively, pressurizer pressure indication will provide the required diagnostic indication. At least one pressure indicator needs to be available following a fire anywhere in the plant. Each pressure instrument is discussed in the following paragraphs.

BBPT0403

Instrument tubing for BBPT0403 runs in areas A-1, A-25, RB-1, RB-2 and RB-11. The transmitter is located in fire area A-1 so the cables do not run in containment. Instrument cable has been analyzed for PFSSD in areas A-1 and A-25 but not RB-1, RB-2 or RB-11.

The two instrument tubes for BBPT0403 enter containment in the South pipe penetration area on 2000-0. The tubing runs north along the west wall until it reaches the far north portion of containment in area RB-2. The tubing then runs south through the bioshield wall into RB-1 where one tube runs to the top of the reactor vessel and the other tube runs to the seal table. From the seal table, a tube runs to the bottom of the reactor vessel in area RB-11.

BBPT0405

Instrument tubing for BBPT0405 runs in areas A-8, A-24, RB-1, RB-2 and RB-11. The transmitter is located in fire area A-8 so the cables do not run in containment. Instrument cable has been analyzed for PFSSD in area A-8 but not A-24, RB-1, RB-2 or RB-11. If a fire occurs in A-24 and affects the BBPT0405 transmitter, then the remaining pressurizer and RCS pressure transmitters are available to provide pressure indication.

The two instrument tubes for BBPT0405 enter containment in the North pipe penetration area on 2000-0. The tubing runs north along the west wall until it reaches the far north portion of containment in area RB-2. The tubing then runs south through the bioshield wall into RB-1 where one tube runs to the top of the reactor vessel and the other tube runs to the seal table. From the seal table, a tube runs to the bottom of the reactor vessel in area RB-11.

BBPT0406

Instrument tubing for BBPT0406 runs in areas A-1, A-25, RB-1, RB-2 and RB-11. The transmitter is located in fire area A-1 so the cables do not run in containment. Instrument cable has been analyzed for PFSSD in area A-1 but not A-25, RB-1, RB-2 or RB-11. A fire in A-25 could also affect BBPT0403. If a fire occurs in A-25 and affects BBPT0403 and BBPT0406, then the remaining pressurizer and RCS pressure transmitters are available to provide pressure indication.

The two instrument tubes for BBPT0406 are the same as those for BBPT0403. See the discussion for BBPT0403 for the routing.

BBPT0455, 456, 457, 458

BBPT0455 and BBPT0456 are located in area RB-4 in the south electrical penetration area. BBPT0457 and BBPT0458 are located in area RB-10 on the southwest end. Instrument tubing for all four transmitters runs in areas RB-4 and RB-10 (within the pressurizer compartment). Instrument cable has been analyzed for PFSSD in areas RB-4 and RB-10 (outside the pressurizer compartment).

Based on Evaluation 1, a fire in RB-4 will not affect the instrument tubing for the four pressure transmitters. In addition, based on Evaluation 1, a fire in RB-10 in the pressurizer compartment is not likely to affect the instrument tubing in a manner that will affect the accuracy of the pressure transmitters.

In the unlikely event a fire does occur in the pressurizer compartment and affect all four pressurizer pressure transmitters, RCS pressure transmitters BBPT0403, BBPT0405 and BBPT0406 remain unaffected because of the physical separation between their instrument tubes and the pressurizer pressure instrument tubes.

Evaluation 2 Conclusion

A fire in containment will not affect all seven credited pressure transmitters. A fire in the area of the pressurizer will not affect RCS pressure transmitters BBPT0403, BBPT0405 and BBPT0406. A fire in the north or west portions of containment will not affect the four pressurizer pressure transmitters. Therefore, pressure indication is available in the event of a fire anywhere in the plant.

Evaluation 3

Containment pressure transmitters GNPT0935 and GNPT0937 are located in fire area A-18. Instrument tube for these transmitters runs into containment and terminates in the north electrical penetration area (RB-3). Containment pressure transmitters GNPT0934 and GNPT0936 are located in fire area A-17. Instrument tube for these transmitters runs into containment and terminates in the south electrical penetration area (RB-4). Cables for these transmitters have been evaluated in the A-17 and A-18 analysis. There are no cables for these transmitters in containment.

The fire protection features provided in areas RB-3 and RB-4 (automatic fire detection and a manually charged closed head fire suppression system) meet the intent of the requirements of 10 CFR 50 Appendix R, Section III.G.2.e as discussed in the Wolf Creek SER. This protection coupled with the low fixed combustible loading and the strict control of transient combustibles in the containment during power operations provides reasonable assurance that a fire of sufficient magnitude to affect all four containment pressure transmitters will not occur.

Since there is significant physical separation between RB-3 and RB-4, a single fire will not affect all four containment pressure transmitters. In the unlikely event a fire does occur and affect two containment pressure transmitters, the only adverse effect will be to actuate a spurious SIS and/or CISB. These spurious signals can be mitigated from the control room. Since line type heat detection is provided in RB-3 and RB-4, operators will have indication of a fire and can rely on the unaffected pressure transmitters to diagnose the condition. A spurious SIS is discussed in the RB area analysis in E-1F9910.

Evaluation 4

EGFT0062 is located in area A-6. Instrument tubes are run in A-6 and A-24. The cable is run in A-6 but not A-24. Therefore, the effects of a fire in A-24 on EGFT0062 have not been analyzed in E-1F9910.

Fire effects on the EGFT0062 instrument tubes could produce a false high flow signal and close valve EGHV0062, stopping CCW return flow from the thermal barriers. If this occurs, operators can open EGHV0132 to re-establish CCW flow to the RCP thermal barriers. EGHV0132 is unaffected by a fire in A-24. RCP seal injection is unaffected by a fire in area A-24.

Based on the above discussion, a fire in A-24 that causes a high flow signal on EGFT0062 will not adversely affect PFSSD.

Evaluation 5

A minimum of two steam generators are required for decay heat removal. At least one level transmitter on two steam generators is required to be operable to provide operators with diagnostic indication of steam generator level.

Instrument tubing associated with steam generator level transmitters on all four steam generators is run in the vicinity of the associated steam generator. The transmitters are located outside the bioshield wall near the associated steam generator. Steam generators A and D are located less than 20 feet apart and steam generators B and C are located less than 20 feet apart. The separation distance between steam generators A/D and B/C is approximately 45 feet. The minimum separation distance between instrument tubing for steam generators A/D and B/C is approximately 35 feet. Intervening combustibles consist of a limited number of cable trays that are provided with automatic fire detection. Some intervening cable trays are enclosed on all sides with sheet metal covers. The cable trays are not continuous. Based on this discussion, separation in accordance with 10CFR50, Appendix R, Section III.G.2.d exists within containment so that level indication on at least two steam generators will be available.

Based on the above discussion, there is reasonable assurance that level indication on at least two steam generators will be available if a single design basis fire occurs in containment when considering damage to instrument tubing. In some cases, operators may need to monitor level on all four steam generators to determine if erratic readings are present. Operator training covers identification and response to erratic indication.

Evaluation 6

Flow transmitters EGFT0128 and EGFT0129 are used to diagnose availability of CCW flow to the RCP thermal barriers. Instrument tubing for these transmiters runs in fire areas A-8 and A-24. Cables for these transmitters runs in fire area A-8 but not A-24. Therefore, the fire area analysis for area A-24 has not addressed the possibility of a loss of these transmitters in the event of a fire in area A-24.

Based on the fire area analysis for fire area A-24 in E-1F9910, thermal barrier cooling and RCP seal injection are unaffected by a fire in area A-24. Loss of flow transmitters EGFT0128 and EGFT0129 in the event of a fire in area A-24 will not adversly impact PFSSD because flow to the thermal barriers is unaffected. Therefore, the configuration is acceptable.

Evaluation 7

Flow indicating switches EJFIS0610 and EJFIS0611 are used to control RHR mini flow valves EJFCV0610 and EJFCV0611, respectively. Low flow in the respective RHR system causes the associated mini flow valve to open to provide protection for the pump. High flow demand causes the respective mini flow valve to close, ensuring maximum flow in the system.

Instrument sensing lines run from the pump discharge piping in fire areas A-9 and A-10 to the associated switch. The cable runs in the same fire areas as the tubing except in fire areas A-9 and A-10. Fire area A-9 contains the heat exchanger for Train B RHR and fire area A-10 contains the heat exchanger for Train A RHR. The fire area analysis for these areas assumes loss of the associated RHR system in the event of a fire. Therefore, the presence of instrument sensing lines for the associated flow indicating switch in these areas does not impact the conclusions in E-1F9910. Therefore, the configuration is acceptable.

6.0 CONCLUSIONS

Based on the evaluation presented herein, fire exposure to the instrument tubing associated with PFSSD equipment will not adversely impact the ability to achieve and maintain safe shutdown.

7.0 REFERENCES

7.1 NEI 00-01, Rev. 2 - Guidance for Post Fire Safe Shutdown Circuit Analysis

7.2 Calculation XX-E-013, Rev. 2 – Post Fire Safe Shutdown Analysis

Attachment 4

Multiple Spurious Operation (MSO) Evaluation

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1.0 PURPOSE

The purpose of this Attachment is to evaluate the Wolf Creek site specific list of MSOs to determine if any of the scenarios could potentially impact the ability to achieve and maintain Post-Fire Safe Shutdown (PFSSD).

2.0 SCOPE

The scope of this evaluation includes all the MSO scenarios on the Wolf Creek MSO list developed from the expert panel on February 17 – 18, 2009. Generic MSO scenarios are identified by the prefix PWROG. Scenarios developed by the Wolf Creek expert panel are identified by the prefix Expert Panel. In addition, MSO scenarios that were developed following completion of the expert panel are identified by the prefix WCNOC. The MSO scenarios are shown on the attached table.

3.0 ASSUMPTIONS

None

4.0 REFERENCES

4.1 INDUSTRY REFERENCES

4.1.1 Nuclear Energy Institute (NEI) document 00-01, Revision 2 - Guidance for Post-Fire Safe Shutdown Circuit Analysis, May 2009.

4.2 NUCLEAR REGULATORY COMMISSION DOCUMENTS

4.2.1 NRC Regulatory Guide 1.189, Revision 2 – Fire Protection for Nuclear Power Plants, October 2009.

4.2.2 Enforcement Guidance Memorandum (EGM) 09-002 – Enforcement Discretion for Fire Induced Circuit Faults, dated May 14, 2009.

4.2.3 License Amendment 189, Wolf Creek Generating Station - Issuance of Amendment RE: License Amendment Request for use of Fire-Resistive Electrical Cable (TAC NO. ME2966), dated 9/30/2010.

4.2.4 License Amendment 190, Wolf Creek Generating Station - Issuance of Amendment RE: Revision to Technical Specification 3.6.3, “Containment Isolation Valves” (TAC NO. ME3279), dated 11/3/2010.

4.2.5 License Amendment 191, Wolf Creek Generating Station - Issuance of Amendment RE: Deviation from Fire Protection Program Requirements (TAC NO. ME0797), dated 12/16/2010 (Operator Manual Actions).

4.2.6 License Amendment 193, Wolf Creek Generating Station - Issuance of Amendment RE: Removing High/Low Pressure Designation from the Pressurizer Power-Operated Relief Valves (TAC NO. ME3766), dated 3/9/2011

4.2.7 License Amendment 205, Wolf Creek Generating Station – Issuance of Amendment RE: Deviation from Fire Protection Requirements for Volume Control Outlet Valves (TAC NO. ME9823), dated 8/23/2013

4.3 WOLF CREEK DOCUMENTS

4.3.1 Calculation WCNOC-CP-002, Rev. 1 – Fire Protection Transient Analysis with Retran 3D.

4.3.2 Condition Report 25002, PFSSD Issues due to Multiple Spurious Operations, dated 4/21/2010

4.3.3 Procedure SYS BG-120, Rev. 43 – Chemical and Volume Control System Startup.

4.3.4 Calculation BG-M-025, Rev. 0 – Potential VCT Drain Down for Fire Protection Analysis.

4.3.5 DCP 13612, Reroute BNLT0932 Cable to Address PFSSD Issue

4.3.6 DCP 13613, Install Meggitt Fire Resistive Cable to Protect BNHV8812B Control Circuit

4.3.7 DCP 13614, Protect Control Circuit Cables for Motor Operated Valves EMHV8801A and EMHV8801B

4.3.8 DCP 13615, Relocate EJFIS0611 to Address PFSSD Concern

4.3.9 DCP 14750, ESW Water Hammer Mitigation – Installation of Cross Tie Check Valves

5.0 EVALUATION

For an evaluation of each MSO scenario, see the table on the following pages.

6.0 CONCLUSIONS

Sixty-two (62) generic and 15 site specific MSO scenarios have been evaluated. Of these 77 scenarios, 24 required further evaluation. Based on the evaluation in following table, 10 MSO scenarios are being addressed by plant modifications. The remaining MSO scenarios that required further evaluation are being addressed by adding components/cables to the PFSSD analysis and/or by requesting deviations via license amendments.

All MSO scenarios have been evaluated and, for those requiring further action, corrective actions have been completed per the action plan in CR 25002.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
PWROG 1	Loss of all RCP Seal Cooling	Spurious isolation of seal injection header flow AND Spurious isolation of CCW flow to thermal barrier heat exchanger	Scenario causes loss of all RCP seal cooling and subsequent RCP seal LOCA, challenging the RCS Inventory Control Function.	BBHV8351A, BBHV8351B, BBHV8351C and/or BBHV8351D AND BBHV0013 (BBFT0017), BBHV0014 (BBFT0018), BBHV0015 (BBFT0019), and/or BBHV0016 (BBFT0020) OR EGHV0058, EGHV0061, EGHV0062 (EGFT0062) or EGHV0071	A-21, C-22, C-30, C-33	The RCP seal injection valves (BBHV8351A, BBHV8351B, BBHV8351C and BBHV8351D) are maintained open and de-energized. The valves are not high/low pressure interfaces so consideration of 3-phase hot shorts is not required. Therefore, a fire will not cause the valves to close in the event of damage to power and control cables associated with these valves. In the four applicable fire areas, at least one charging pump will be available to provide seal cooling through the open seal injection valves. License Amendment 190 was issued by the NRC on November 3, 2010. This amendment approved the Technical Specification change to operate with the RCP seal injection valves open and de-energized. Based on the above discussion, a loss of all RCP seal cooling, as a result of this MSO scenario, will not occur in any fire area at Wolf Creek.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
PWROG 2	Loss of all RCP Seal Cooling	Spurious opening of charging injection valve(s) causing diversion flow away from seals, AND Spurious isolation of CCW flow to thermal barrier heat exchanger	Scenario causes loss of all RCP seal cooling and subsequent RCP seal LOCA, challenging the RCS Inventory Control Function.	EMHV8801A or EMHV8801B AND EMHV8803A or EMHV8803B AND BBHV0013 (BBFT0017), BBHV0014 (BBFT0018), BBHV0015 (BBFT0019), and/or BBHV0016 (BBFT0020) OR EGHV0058, EGHV0061, EGHV0062 (EGFT0062) or EGHV0071	A-8, A-11, A-18, A-21, C-18, C-22, C-24, C-30, C-33	Calculation change notice (CCN) SA-91-016-000-CN002 calculates the charging flow to the RCP seals and RCS injection points at various RCS pressures. Page 155 of this CCN shows the values at an RCS pressure of 2235 psi. The results show a total flow rate of 23.23 gpm to the seals, which is 5.8 gpm per pump. This flow rate is sufficient to maintain the RCP seals cool. Procedure OFN BB-005 Section 2.0, Symptoms or Entry Conditions, requires entry whenever seal flow is less than 6 gpm. Minimum seal flow is from M-712-00068. As the RCP pressure drops, flow to the seals will increase as shown in this calculation. The calculation reduced the centrifugal charging pump curve by 10% for conservatism. Removing this conservatism would yield higher seal injection flow. In all applicable fire areas, at least one charging pump remains available. Based on the above discussion, spurious opening of the charging injection lines will not adversely impact RCP seal injection. Therefore, this MSO scenario is not an issue at Wolf Creek.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
PWROG 3	Thermal Shock of RCP Seals	Loss of all Seal Cooling to any RCP(s). See Scenarios 1 & 2, AND Spurious re-initiation of seal cooling (i.e., seal injection or CCW to TBHX)	Thermal shock of seals causes catastrophic RCP seal failure and subsequent RCP seal LOCA, challenging the RCS Inventory Control Function.	Same as PWROG 1 or 2 AND EGHV0058 AND EGHV0071 or EGHV0126 AND EGHV0127 AND EGHV0062 or EGHV0132 AND EGHV0061 or EGHV0133	A-21, C-22, C-30, C-33	Based on the response to scenarios PWROG 1 and PWROG 2, this MSO scenario is not credible because RCP seal injection will not be lost as a result of these scenarios. Based on the above discussion, thermal shock of the RCP seals, as a result of this MSO scenario, will not occur in any fire area at Wolf Creek.
PWROG 4	Catastrophic RCP Seal Failure	Loss of all Seal Cooling to any RCP(s). See Scenarios 1 & 2, AND Fire prevents tripping, or spuriously starts, RCP(s)	Scenario causes catastrophic RCP seal failure and subsequent RCP seal LOCA, challenging the RCS Inventory Control Function.	Same as PWROG 1 or 2 AND PBB01A, PBB01B, PBB01C or PBB01D	C-22	Based on the response to scenarios PWROG 1 and PWROG 2, this MSO scenario is not credible because RCP seal injection will not be lost as a result of these scenarios. Based on the above discussion, catastrophic RCP seal failure, as a result of this MSO scenario, will not occur in any fire area at Wolf Creek.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
PWROG 5	RCP Seal No. 2 Failure	Loss of all Seal Cooling to any RCP(s). See Scenarios 1 & 2, AND Spurious isolation of No. 1 seal leakoff valve(s)	Isolation of the No. 1 seal leakoff line during a loss of all seal cooling event would force the No. 2 RCP seal into a high pressure mode of operation at high temperature, which is beyond the design basis of the No. 2 seal. This could cause catastrophic failure of the No. 2 seal and increase RCS leakage.	Same as PWROG 1 or 2 AND BBHV8141A, BBHV8141B, BBHV8141C or BBHV8141D	A-21, C-22, C-30, C-33	Valves BBHV8141A – D are not PFSSD. Valves are fail open, energize to close. No credible intracable hot short scenarios exist for these valves. An intercable hot short of the correct polarity would be required to close the valves. Cables are run in raceway where this is possible. Therefore, assume valves BBHV8141A – D can spuriously close. Based on the response to scenarios PWROG 1 and PWROG 2, this MSO scenario is not credible because RCP seal injection will not be lost as a result of these scenarios. Based on the above discussion, RCP seal No. 2 failure, as a result of this MSO scenario, will not occur in any fire area at Wolf Creek.
PWROG 6	Letdown Fails to Isolate and Inventory Lost to CVCS	Spurious opening of (or failure to close) letdown isolation valve(s), AND Spurious opening of (or failure to close) letdown orifice valve(s)	Letdown Fails to Isolate and Inventory Lost to CVCS causes loss of RCS inventory, challenging the RCS Inventory Control Function.	BGLCV0459 and BGLCV0460 AND BGHV0149A, BGHV0149B or BGHV0149C	A-1, A-11, A-18, C-7, C-12, C-18, C-21, C-24, RB	In all the applicable fire areas except C-21, the letdown isolation valves can be failed closed by isolating KAFV0029 using KAHIS0029 in the control room. In fire area C-21, License Amendment 191, issued on December 16, 2010, allows the use of operator manual action to close KAV0201 to fail close the letdown isolation valves. Based on the above discussion, this MSO scenario is not an issue at Wolf Creek.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
PWROG 7	Letdown Fails to Isolate and Inventory Lost to PRT	Letdown fails to isolate (see Scenario 6), AND Spurious closure of downstream containment isolation valve	Scenario causes letdown flow to PRT through relief valve. This letdown flow is assumed unavailable for RCS makeup.	Same as PWROG 6 AND BGHV8152, BGHV8160, or BGPCV0131	A-1, A-11, A-18, C-7, C-12, C-18, C-21, C-24, RB	BGHV8152, BGHV8160 and BGPCV0131 are not analyzed in the PFSSD analysis. Therefore, the circuits are not evaluated. Assume this MSO scenario can occur anywhere scenario PWROG 6 can occur. Based on the evaluation for scenario PWROG 6, letdown can be isolated in the event of a fire in any area of the plant. Therefore, this MSO scenario is not an issue at Wolf Creek.
PWROG 8	Excess Letdown Fails to Isolate	Spurious opening of (or failure to close) multiple series excess letdown isolation valves	Scenario causes loss of RCS inventory to the CVCS system, challenging the RCS Inventory Control Function. The RCS inventory (letdown) is assumed lost and unavailable for makeup. In reality, additional failures downstream of the excess letdown isolation valves would have to occur for this RCS inventory to be unavailable for makeup.	BGHV8153A and BGHV8154A OR BGHV8153B and BGHV8154B AND BBHV8157A, BBHV8157B or BGHCV0123	RB	Inventory lost through the excess letdown line would normally be returned to the VCT through the RCP seal return path. This pathway is isolated during an SI which could cause loss of RCS inventory to the PRT through the RCP seal return line relief valve. Thermal hydraulic analysis (Calc WCNOC-CP-002) shows that the excess letdown valves can remain open with no adverse impact on PFSSD, as long as letdown is isolated. Based on the above discussion, this MSO scenario is not an issue at Wolf Creek.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
PWROG 9	RCS Makeup Isolation	Spurious isolation of seal injection flow path, AND/OR Spurious isolation of normal charging flow path, AND/OR Spurious isolation of charging injection flow path	Scenario isolates all high head RCS makeup flow paths, challenging the RCS Inventory Control Function.	BGFCV0462, BGHCV0182, BGHV8105 or BGHV8106 AND BGFCV0121 or BBHV8351A, BBHV8351B, BBHV8351C and/or BBHV8351D AND BGHV8357A or BGHV8357B	A-21, C-22, C-30, C-33	Valves BGFCV0462, BGHCV0182 and BGFCV0121 are not analyzed in the PFSSD analysis. This scenario is considered wherever cables for BGHV8105 or BGHV8106 and BBHV8351A, BBHV8351B, BBHV8351C and/or BBHV8351D are located. The NCP is not analyzed in the PFSSD analysis, therefore, the normal charging flow path is assumed lost in all fire areas. In all of the applicable fire areas, the A Train CCP is available to provide makeup to the RCS through the BIT. Also, see scenario PWROG 1 for discussion about the seal injection valves. Since the BIT flowpath is available and the seal injection flowpath remains available based on the discussion in PWROG 1, this MSO scenario is not an issue at Wolf Creek.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
PWROG 10	Charging Pump Inoperability	Initial condition is charging pump running with normal lineup taking suction from VCT. Spurious isolation of suction from VCT to running charging pump, AND Spurious isolation of (or failure to open) suction from RWST to running charging pump	Scenario causes charging pump inoperability, challenging the RCS Inventory Control Function. This is especially challenging if the credited charging pump is running at the time of the fire.	BGLCV112B (BGLT0112) or BGLCV112C (BGLT0185) AND BNLCV112D (BGLT0112) and BNLCV112E (BGLT0185)	<u>BGLCV112B</u> C-9, C-12, C-18, C-21, C-24 <u>BGLCV112C</u> C-10, C-11, C-17, C-22, C-23, C-30, C-33 <u>BNLCV112D</u> A-2, A-8, C-9, C-12, C-18, C-21 <u>BNLCV112E</u> A-1, A-4, C-1, C-10, C-11, C-17, C-22, C-23, C-30, C-33	Either VCT outlet valve BGLCV112B or BGLCV112C can spuriously close if a fire occurs in any of the applicable fire areas listed. At least one RWST to charging header valve (BNLCV112D or BNLCV112E) is unaffected. However, the RWST valves do not automatically open when one of the VCT valves closes. The RWST to charging valves automatically open on a SIS or low-low VCT level. Therefore, if one VCT valve spuriously closes, an operator in the control room would have to open the available RWST valve. The NCP is the normally operating charging pump and is assumed to be running at the time of the fire. The NCP is not credited for PFSSD. If the MSO occurs, the NCP could be damaged but the credited charging pump will not be affected because it is assumed to be in standby mode. In addition, procedure SYS BG-120 establishes compensatory measures in the applicable fire areas when either CCP is started. Based on the above discussion, this MSO scenario is not an issue at Wolf Creek because at least one RWST valve is unaffected in those areas where the VCT valve could spuriously close.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
PWROG 11	Charging Pump Inoperability	Initial condition is charging pump running and drawing suction from RWST. Spurious isolation of two parallel RWST outlet valves.	Scenario causes loss of charging pump suction, causing subsequent pump cavitation and inoperability. This challenges the RCS Inventory Control Function.	BNLCV112D and BNLCV112E	None	There are no III.G.2 fire areas where cables for both RWST to CCP suction valves are run. Therefore, this MSO scenario is not an issue at Wolf Creek.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
PWROG 12	Charging Pump Inoperability	Spurious opening (or failure to close) of multiple series VCT outlet valves	Scenario causes VCT drain down and hydrogen cover gas entrainment into charging pump suction, ultimately causing charging pump inoperability and challenging the RCS Inventory Control Function. This is especially challenging if the credited charging pump is running at the time of the fire. Note this scenario assumes that VCT makeup has been isolated (i.e., letdown isolated).	BGLCV112B and BGLCV112C	A-8	Fire area A-8 contains both VCT valves as well as power cables for these valves. Therefore, a fire in this area could prevent closing one of the valves. Fire would also have to affect makeup to the VCT from letdown. Since the letdown flowpath is not fully analyzed, it is assumed that makeup to the VCT is affected. The Train B CCP is the credited charging pump for a fire in area A-8. The NCP is the normally operating charging pump and is assumed to be running at the time of the fire. The NCP is not credited for PFSSD. If the MSO occurs, the NCP could be damaged but the credited charging pump will not be affected because it is assumed to be in standby mode. A spurious SIS coincident with this MSO will start both charging pumps. License Amendment 205 was issued on August 23, 2013 and allows a deviation from the separation requirements of 10 CFR 50, Appendix R for the VCT outlet valves. Based on the Safety Evaluation for Amendment 205, the fire protection features as well as the low combustible loading in fire area A-8 provides reasonable assurance that at least one VCT outlet valve will respond to a close signal from the control room following a fire. Procedure OFN KC-016 has been revised to direct operators to close both VCT outlet valves in the event of a fire in area A-8. Therefore, this MSO issue is considered resolved.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
PWROG 13	Charging Pump Inoperability	Letdown fails to isolate (see Scenario 6), AND Spurious isolation of CCW cooling to the letdown heat exchanger	Scenario causes elevated charging pump suction temperature and subsequent pump inoperability. Charging pump inoperability challenges the RCS Inventory Control Function. This is especially challenging if the credited charging pump is running at the time of the fire.	PWROG 6 AND BGTV0130	A-1, A-11, A-18, C-7, C-12, C-18, C-21, C-24, RB	BGTV0130 is not included in the PFSSD analysis. Therefore, assume the valve closes in all fire areas. Water returning to the VCT would be cooled slightly by the regenerative heat exchanger to about 280 degrees F. The letdown heat exchanger further reduces the temperature to around 109 degrees F. Without cooling to the letdown heat exchanger, the 280 degree water would enter the CCP suction and would flash to steam, causing damage to the pump. At least one of the VCT outlet valves can be closed in the event of a fire in any of these areas, preventing hot water from entering the CCP suction. One of the RWST valves can be opened to provide suction to the CCP. Therefore, this MSO can be mitigated from the control room. Isolation of the VCT outlet valves without isolation of letdown would cause RCS water to overflow the VCT and flow to the waste gas compressor or the boron recycle holdup tank, which is not desired. Based on scenario PWROG 6, letdown can be isolated in the event of a fire in any area. Therefore, this concern can be mitigated. Based on the above discussion, this MSO scenario is not an issue at Wolf Creek.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
PWROG 14	Charging Pump Inoperability	Charging pump runout when RCS is depressurized	Scenario causes charging pump runout and failure. Pump(s) must be running when RCS is at a depressurized condition. RCS depressurization could occur due to spurious opening of pressurizer PORV(s), for example.	PBG05A PBG05B AND BBPCV0455A And/or BBPCV0456A	None	This scenario is not postulated to occur at Wolf Creek because the credited charging pump is unaffected by a fire in any area and can be stopped if the RCS is completely depressurized. Furthermore, there are no credible scenarios that would lead to a complete depressurization of the RCS. One or both pressurizer PORVs could open if the fire is in certain areas. See PWROG 18 for discussion about the PORVS. See PWROG 36 for discussion about RCS pressure decrease. Based on the above discussion, this MSO scenario is not an issue at Wolf Creek.
PWROG 15	RWST Drain Down via Containment Sump	Spurious opening of multiple series containment sump valves	Scenario causes RWST drain down to the containment sump. Since typical PFSS analyses do not credit alignment of containment sump, the RWST inventory becomes unavailable for RCS makeup, challenging the RCS Inventory Control Function.	BNHV8812A and EJHV8811A OR BNHV8812B and EJHV8811B	A-11, A-16S, A-17, A-18, A-19, A-21, A-22, A-26, A-27	Scenario for Wolf Creek requires spurious opening of EJHV8811A (B) and failure of BNHV8812A (B) to automatically close. Some cables associated with these valves have been re-routed in DCP 12307. The re-routing ensures the redundant valves are not affected by a single fire. In the fire areas listed, manual action in the control room is necessary to close the BN valve if the EJ valve spuriously opens. Since the action is in the control room, the regulatory requirements are met. Based on the above discussion, no further actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
PWROG 16	RWST Drain Down via Containment Spray	Spurious opening of containment spray header valve(s), AND Spurious starting of containment spray pump(s) and/or RHR pump(s).	Scenario causes a pumped RWST draindown via the containment spray ring. The RWST inventory ultimately settles to the containment sump. Since typical PFSS analyses do not credit alignment of the containment sump, the RWST inventory is assumed unavailable for RCS makeup, challenging the RCS Inventory Control Function.	ENHV0006 AND PEN01A OR ENHV0012 AND PEN01B	C-18, C-21, C-22, C-23, C-24, C-30, C-33	Actuation of Containment Spray (CS) due to spurious containment spray actuation signals (CSAS) is addressed in scenario PWROG 56d. This MSO scenario addresses spurious opening of the valve coincident with spurious start of the pump not caused by a spurious CSAS. For a fire in each of these areas, only one flowpath will spuriously actuate. Therefore, RWST draindown will be limited to the flow from a single CS pump. License Amendment 191, issued on December 16, 2010, allows use of operator manual actions to mitigate spurious CS actuation in these fire areas. Wolf Creek document E-1F9900 demonstrates that feasible and reliable manual actions are available to stop CS prior to the RWST reaching levels below that required to achieve cold shutdown. Based on the above discussion, no further actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
PWROG 17	Interfacing System LOCA	Spurious opening of multiple series RHR suction valves from RCS	Scenario causes interfacing system LOCA, challenging the RCS Inventory Control Function.	BBPV8702A and EJHV8701A OR BBPV8702B and EJHV8701B	None	All four valves are normally de-energized. Therefore this scenario would require proper polarity hot short of power cables plus damage to control cables. These valves are considered high-low pressure interface components, so consideration of these circuit failures is required. Power cables for the BB valves are run in separate areas from power cables for the EJ valves outside containment. Inside containment, the power cables for the valves do not run in raceway with other 3 phase 480 VAC power cables so a proper polarity hot short is not credible and the valves will not open. For details, see E-1F9910. Based on the above discussion, no further actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
PWROG 18	Multiple Pressurizer PORVs	Spurious opening of multiple (two or three) Pressurizer PORVs with corresponding block valves in normal, open position	Scenario causes loss of RCS inventory through the pressurizer PORVs, challenging the RCS Inventory Control Function. Scenario also causes pressurizer depressurization, challenging the RCS Pressure Control Function.	BBPCV0455A and BBHV8000A AND BBPCV0456A and BBHV8000B	A-27, RB	License Amendment 193 was issued on March 9, 2011. This amendment changed the classification of the pressurizer PORVs from high/low to non-high/low pressure interface. Therefore, Wolf Creek can use the circuit failure criteria for non-high/low pressure interface components when evaluating the pressurizer PORVs. Change package 12944 was implemented during RF18. This change package re-wired the PORV control circuits so that a spurious PORV opening due to a single proper polarity hot short can be mitigated from the control room. Based on the above discussion, spurious opening of two PORVs due to a fire in areas A-27 and RB can be mitigated from the control room. Therefore, no further actions are needed to address this MSO scenario.
PWROG 19	Pressurizer PORV and Block Valve	Spurious opening of Pressurizer PORV(s), AND Spurious opening of block valve(s) after it has been closed.	Scenario causes loss of RCS inventory through the pressurizer PORV(s), challenging the RCS Inventory Control Function. Scenario also causes pressurizer depressurization, challenging the RCS Pressure Control Function.	BBPCV0455A AND BBHV8000A OR BBPCV0456A AND BBHV8000B	None	There are no fire areas where the PORV can open and the block valve can be credited as closing. The PORV and redundant block valve cables are run in the same fire areas. So, if the PORV is postulated to spuriously open, then the same fire is postulated to prevent the block valve from closing. Therefore, since the block valve cannot be credited to close, it cannot be postulated that it closes then re-opens. See PWROG 18 for discussion of multiple PORVs opening Based on the above discussion, this MSO scenario is not an issue at Wolf Creek.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
PWROG 20	Reactor Head Vent Valves	Spurious opening of multiple series reactor head vent valves	Scenario causes loss of RCS inventory through open reactor head vent flowpath(s), challenging the RCS Inventory Control Function.	BBHV8001A and BBHV8002A OR BBHV8001B and BBHV8002B	None	There are no fire areas where both redundant reactor head vent valve flow paths will spuriously open. Therefore, this MSO scenario is not an issue at Wolf Creek.
PWROG 21	Excess RCS Makeup	Spurious starting of additional high head charging pump(s), AND Spurious opening of additional RCS makeup flow paths (i.e., charging injection)	Scenario causes increasing RCS inventory, leading to a water solid pressurizer and PORV or safety valve opening. This scenario challenges both RCS Inventory and RCS Pressure Control Functions.	PBG04, PBG05A or PBG05B AND EMHV8801A or EMHV8801B AND EMHV8803A or EMHV8803B	C-18, C-21, C-22, C-24, C-30, C-33	This scenario addresses spurious opening of the BIT valves and start of the charging pumps without a spurious SIS. Spurious SIS is discussed in scenario PWROG 56. The NCP is not analyzed and is assumed to be running during this scenario, except as discussed below. Normal charging valve BGHV8105 or BGHV8106 can be isolated from the control room for a fire in all fire areas except A-24, where the valves are located. There are no cables for the NCP in A-24, so there is reasonable assurance that the NCP can be stopped from the control room if the fire is in A-24. Pressurizer level indication is available to diagnose excess RCS makeup. CCP status could be affected and valve position indication could be affected. Only one CCP would spuriously run in this scenario. Based on the pump curve (M-721-00439) and normal operating pressure at 2235 psig, the pump will discharge approximately 275 gpm. The pressurizer is normally maintained at approximately 60 % which is 8,109 gallons per WCRE-03. 100% indicated level is 13,090 gallons.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
						Therefore, 4,981 gallons is available before going solid. Therefore it would take about 18 minutes to fill the pressurizer. The flow rate does not consider friction loss and elevation differences in the pipe. This calc would need to be formalized if it is to be used to justify timing. Since a spurious SI does not cause this MSO, EMG E-0 would not be entered. DCP 13614 was implemented to address this MSO scenario. The DCP used a combination of fire resistive cables and cable re-routing to ensure a fire will not spuriously open the BIT valves in the applicable fire areas. Therefore, there is reasonable assurance that the postulated MSO scenario will not occur at Wolf Creek.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
PWROG 22	Primary Sample System	Spurious opening of RCS sample valve(s) (i.e., hot leg, PZR liquid space, PZR steam space, etc.), AND Spurious opening of inside containment isolation valve, AND Spurious opening of outside containment isolation valve, AND Spurious opening of downstream sample valve(s)	Scenario causes loss of reactor coolant through the primary sample system, challenging the RCS Inventory Control Function.	SJHV0003 SJHV0004 SJHV0005 SJHV0006 SJHV0012 SJHV0013 SJHV0020 SJHV0127 SJHV0128 SJHV0129 SJHV0130 SJHV0133	None	None of the SJ valves are PFSSD. Therefore, they are all assumed to fail open in a fire. Sample lines are isolated by a normally closed manual isolation valve downstream of the sample coolers. (M-12SJ01) Based on the above discussion, no actions are needed to address this MSO.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
Expert Panel 1	Letdown Fails to Isolate and Inventory Lost to RHT	Letdown fails to isolate (see Scenario 6), AND Spurious diversion of letdown flow to recycle hold-up tank	Scenario causes letdown flow to RHT through divert valve. This letdown flow is assumed unavailable for RCS makeup.	Same as PWROG 6 AND BGLCV0112A (BGLT0149)	None	Divert valve BGLCV0112A is not analyzed in the PFSSD analysis and is assumed failed in the worse position. The signal from BGLT0149 is used to control the divert valve. BGLT0149 is not PFSSD. Damage to BGLT0185 or failure of BGLCV0112C and BNLCV0112E to operate would be required to prevent re-alignment of CCP suction to the RWST. See PWROG 6 discussion for resolution of letdown isolation concern. Based on the above discussion, no actions are needed to address this MSO.
Expert Panel 2	Injection Flow Diverted to RWST or RHT	Scenario assumes high head injection is in operation. BIT test line opens to divert injection flow to the RWST or RHT	Scenario causes diversion of high head injection and loss of RCS makeup.	EMHV8843 or EMHV8882 AND EMHV8871 AND EMHV8964	None	The PFSSD analysis (E-1F9910) shows that this MSO cannot occur due to a fire in any fire area. Therefore, no actions are needed to address this MSO.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
Expert Panel 3	Isolation of Charging Pump Miniflow	Spurious closure of normal charging isolation valve AND Spurious closure of pump miniflow valve	Scenario causes overheating and eventual failure of affected pump.	BGFCV0462 and BGHV8109 OR BGFCV0121 and BGHV8110 or BGHV8111	<u>BGHV8110</u> A-1, A-2, A-8, C-9, C-12, C-18, C-21, C-24 <u>BGHV8111</u> A-1, A-4, C-1, C-10, C-11, C-17, C-22, C-23, C-30, C-33 <u>Spurious SI</u> A-8, A-13, A-15, A-16N/S, A-17, A-18, A-23, A-27, C-21, RB	The NCP is not credited for PFSSD. Damage to it will not affect PFSSD. BGHV8109 is not analyzed in the PFSSD analysis and is assumed failed in all fire areas. BGFCV0121 is not analyzed in the PFSSD analysis and is assumed failed in all fire areas. In fire area A-1, cables for BGHV8110 are protected. The PFSSD analysis (E-1F9910) shows that for each fire area, one of the two CCPs will be available and the associated miniflow valve is unaffected. A spurious SIS will cause both CCPs to start. If this occurs and the associated miniflow valve is also affected by the fire or the BIT injection flowpath is affected, then damage to the CCP could occur due to low flow. A fire in areas A-8 and C-21 could cause a spurious SIS coincident with BGHV8110 valve closure. There are no fire areas where a SIS can occur coincident with failure of BGHV8111. In A-8 and C-21, Train B CCP is credited with miniflow through BGHV8111. Based on the above discussion, no actions are needed to address this MSO scenario.
Expert Panel 4	Loss of Low Head SI Pump Suction	Spurious RWST Low Level indication resulting in:	Scenario causes failure of low head SI pumps when required for recirculation.	2/4 Low-Low on BNLT0930, BNLT0931, BNLT0932, and BNLT0933	A-19, A-20, A-22, A-27, C-21, F-1, F-2, F-5, F-7, RWST	This scenario is discussed further in PWROG 56a where a SIS occurs coincident with a spurious low RWST level. If a spurious low RWST level occurs without a SIS,

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
		Closure of RWST to high head pumps AND Containment Sump Suction valves open with insufficient water level in sump			BNLT930 A-19, A-20, A-22, C-21, C-24, C-31, F-1, F-2, F-5, F-7, RWST BNLT931 A-19, A-20, A-21, C-32, F-1, F-2, F-5, F-7, RWST BNLT932 A-16N, A-19, A-20, A-22, A-27, C-21, C-26, F-2, F-5, F-7, RWST BNLT933 A-16S, A-17, A-27, C-22, C-23, C-30, C-33, F-2, F-4, F-5, RWST	there will be no adverse impact. Therefore, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
Expert Panel 5	Failure of ECCS Sump Alignment	Spurious RWST High Level indication resulting in: Exhaustion of RWST inventory AND Failure of automatic transfer to ECCS Sump suction source.	Scenario causes damage to CCPs and/or low head SI pumps due to loss of suction source.	SIS AND BNLT0930, BNLT0931, BNLT0932, and BNLT0933	None	Scenario assumes SI flow is in progress due to spurious SI and/or Bleed and Feed operation. Scenario also assumes high water loss rate from the RWST, causing the RWST to empty faster than expected, but the level indicators are reading normal. This would not be the case since the assumption is that no other design basis events occur with the fire. Therefore RWST water usage would be that needed to maintain RCS inventory during hot standby and cold shutdown. RWST draindown caused by the fire is addressed in other MSO scenarios. In all fire areas at Wolf Creek where a SIS can occur, there is at least one RWST level indicator that is unaffected by the fire. Therefore, operators will have RWST level indication available. Based on the above discussion, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
Expert Panel 6	RCP Seal Return Diverted to PRT	Spurious closure of RCP seal return line isolation valve.	Scenario causes loss of RCS inventory to the PRT challenging the RCS Inventory Control function.	BGHV8100 OR BGHV8112	All	This is actually a single spurious scenario that is documented in XX-E-013. BGHV8100 is not included in the PFSSD analysis and is assumed to close in the event of a fire in all fire areas. BGHV8112 is included in the PFSSD analysis because it is needed for a fire in area A-16S. For PFSSD following this scenario, the position of these valves will not affect safe shutdown. If the valves fail closed and seal leakoff is diverted to the PRT, the maximum loss would be 84 gpm (21 gpm per pump). Based on XX-E-013, 214,260 gallons can be lost from the RWST and still have enough for cold shutdown. Therefore, it would take 42 hours to challenge cold shutdown. Cold shutdown manual actions can be taken prior to 42 hours to stop the loss. Based on the above discussion, no actions are needed to address this MSO scenario.
Expert Panel 7	Loss of all RCP Seal Cooling	Loss of Letdown Flow to VCT AND Failure of RWST supply to high head pumps AND Spurious isolation of CCW flow to thermal barrier heat exchanger	Scenario causes loss of all charging pumps due to loss of suction sources, loss of RCP Thermal Barrier cooling and subsequent RCP seal LOCA, challenging the RCS Inventory Control Function.	BGLCV0459, BGLCV0460, BGHV8152, BGHV8160, BGPCV0131, or BGLCV0112A OR BGHV0149A, BGHV0149B and BGHV0149C AND	<u>BNLCV112D</u> A-2, A-8, C-9, C-12, C-18, C-21 <u>BNLCV112E</u> A-1, A-4, C-1, C-10, C-11, C-17, C-22, C-23, C-30, C-33 <u>TBC Valves</u> A-8, A-11, A-18, A-19, A-22, C-18, C-21, C-24, C-31, RB	Spurious isolation of letdown was not addressed in PFSSD analysis. Letdown was only analyzed for isolation capability, not availability. PWROG 10 addresses availability of RWST to CCP suction valves. At least one valve will be available to open in all fire areas. Therefore, CCP suction is available from the RWST and, per License Amendment 190, the RCP seal injection valves are de-energized open (See scenario PWROG 1). Thermal barrier cooling can be lost in fire areas A-6, A-8, A-11, A-16N/S, A-17, A-18, A-19, A-21, A-

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Inventory Control						
				BNLCV0112D and BNLCV0112E AND BBHV0013 (BBFT0017), BBHV0014 (BBFT0018), BBHV0015 (BBFT0019), and/or BBHV0016 (BBFT0020) OR EGHV0058, EGHV0061, EGHV0062 (EGFT0062) or EGHV0071	EGHV58 A-8, A-11, A-18, C-18, C-21, C-24 EGHV61 A-19, A-22, C-21, C-24, C-31 EGHV62 A-6, A-16N/S, A-17, A-21, A-27, C-22, C-23, C-30, C-33 EGHV71 A-21, C-22, C-30, C-33	22, A-27, C-18, C-21, C-22, C-23, C-24, C-30, C-31, C-33 and RB. Since the RWST is available in all fire areas, this scenario is not an issue at Wolf Creek. Therefore, no actions are needed to address this MSO.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Decay Heat Removal						
PWROG 23	Inadvertent Steam Dumping	Spurious opening of multiple atmospheric steam dump valves upstream of MSIV	Scenario causes RCS over-cooling. Also, the overcooling can cause RCS shrinkage, causing low pressurizer level, and challenging the RCS Inventory Control Function.	ABPV0001 (ABPT0001) ABPV0002 (ABPT0002) ABPV0003 (ABPT0003) ABPV0004 (ABPT0004)	A-8, A-16N, A-23, A-27, A-28, C-10, C-21, C-22	Based on Calculation WCNOC-CP-002, 3 failed open ARVs in combination with other potential failures will not challenge PFSSD. There are no fire areas at Wolf Creek where all 4 ARVs can fail open. Fire area A-16N is the only area where 3 ARVs can fail. The manual action feasibility and reliability analysis documented in E-1F9900 for fire area A-16 has operators mitigate 3 failed closed ARVs because allowing the safety valves to operate is not consistent with the desire to ensure plant operators have control of the plant. This manual action was approved by the NRC in License Amendment 191 issued on December 16, 2010. Based on the above discussion, no further actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Decay Heat Removal						
PWROG 24	Inadvertent Steam Dumping	MSIV(s) spurious opening, or failure to close, AND Spurious opening, or failure to close, of downstream steam loads (e.g., condenser steam dumps, turbine inlet valves, etc.)	Scenario causes RCS over-cooling. Also, the overcooling can cause RCS shrinkage, causing low pressurizer level, and challenging the RCS Inventory Control Function.	ABHV0011, ABHV0014, ABHV0017 or ABHV20 AND ABUV0034, ABUV0035, ABUV0036, ABUV0037, ABUV0038, ABUV0039, ABUV0040, ABUV0041, ABUV0042, ABUV0043, ABUV0044 or ABUV0045 OR ACFCV0043 and ACFCV0047 or ACFCV0044 and ACFCV0049 or ACFCV0045 and ACFCV0048 or ACFCV0046 and ACFCV0050	None	There are no fire areas where this MSO can occur. E-1F9910 and XX-E-013 show that the MSIVs or the downstream valves can be closed in the event of a fire in any fire area. Therefore, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Decay Heat Removal						
PWROG 25	Inadvertent Steam Dumping	MSIV bypass valve(s) spurious opening, or failure to close, AND Spurious opening, or failure to close, of down stream steam loads (e.g., condenser steam dumps, turbine inlet valves, etc.)	Scenario causes RCS over-cooling. Also, the overcooling can cause RCS shrinkage, causing low pressurizer level, and challenging the RCS Inventory Control Function.	ABHV0012, ABHV0015, ABHV0018 or ABHV0021 AND ABUV0034, ABUV0035, ABUV0036, ABUV0037, ABUV0038, ABUV0039, ABUV0040, ABUV0041, ABUV0042, ABUV0043, ABUV0044 or ABUV0045 OR ACFCV0043 and ACFCV0047 or ACFCV0044 and ACFCV0049 or ACFCV0045 and ACFCV0048 or ACFCV0046 and ACFCV0050	None	There are no fire areas where this MSO can occur. E-1F9910 and XX-E-013 show that the MSIV bypass valves or the downstream valves can be closed in the event of a fire in any fire area. Therefore, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Decay Heat Removal						
PWROG 26	Inadvertent Steam Dumping	Spurious operation of main steam header drain valve(s)	Scenario may cause RCS over-cooling. Also, the overcooling can cause RCS shrinkage, causing low pressurizer level, and challenging the RCS Inventory Control Function.	ABLV0007, ABLV0008, ABLV0009 ABLV0010, ABLV0050, ABLV0051, ABLV0052 or ABLV0053	None	ABLV0007, ABLV0008, ABLV0009 and ABLV0010 are not analyzed in the PFSSD analysis. These valves are on 1 inch drain lines upstream of the MSIVs and spurious opening will not challenge RCS cooldown function based on WCNOC-CP-002 which shows that 3 steam generator ARVs (8 inch valves) can fail open with no adverse impact on PFSSD. Based on E-1F9910 and XX-E-013, in fire areas where the MSIVs may be affected, valves ABLV0050, ABLV0051, ABLV0052 and ABLV0053 are unaffected. Based on the above discussion, no actions are needed to address this MSO scenario.
PWROG 27	Turbine Driven AFW Pump Inoperability	Spurious isolation of redundant steam supply valves to turbine driven AFW pump	Scenario causes turbine driven AFW pump inoperability, which challenges the Decay Heat Removal Function.	ABHV0005 and ABHV0006	A-13, A-15, A-16N, A-18, A-23E, A-24, A-27, A-28S, C-10, C-20, C-22, C-25, C-30, C-32, C-34	Based on E-1F9910, in fire areas where the TDAFP is inoperable one of the motor driven AFW pumps is available. Calculation WCNOC-CP-002 shows PFSSD is assured using one MDAFP and 2 steam generators. Therefore, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Decay Heat Removal						
PWROG 28	AFW Flow Isolation	Spurious closure of multiple valves in AFW pump discharge flow path(s)	Scenario isolates AFW flow to the steam generator(s), challenging the Decay Heat Removal Function.	ALHV0005 (ALFT0001), ALHV0007 (ALFT0007), ALHV0009 (ALFT0009) and/or ALHV0011 (ALFT0011) OR ALHV0006, ALHV0008, ALHV0010 and/or ALHV0012	Various	E-1F9910 shows that failure of multiple valves in the AFW pump discharge lines will not adversely impact PFSSD because redundant AFW flowpaths are available. In most cases, the available AFW flowpaths will supply steam generators whose ARVs are unaffected and, where this is not the case, calculation WCNOC-CP-002 and E-1F9915 provide justification for acceptability. Based on the above discussion, no actions are needed to address this MSO scenario.
PWROG 29	AFW Flow Isolation	Spurious closure of steam supply valve(s) to turbine driven AFW pump, AND Spurious isolation of AFW pump discharge flow path(s)	Scenario isolates AFW flow to the steam generator(s) and causes turbine driven AFW pump inoperability, challenging the Decay Heat Removal Function.	ABHV0005 and ABHV0006 AND ALHV0005 (ALFT0001), ALHV0007 (ALFT0007), ALHV0009 (ALFT0009) and/or ALHV0011 (ALFT0011)	A-13, A-15, A-16N, A-18, A-24, A-28S, C-10, C-22, C-30	The fire areas listed are those where the steam supplies to the TDAFP can be lost coincident with a loss of at least one MDAFP supply to a steam generator. Based on E-1F9910, there are no fire areas where a loss of steam supply to the TDAFP can occur coincident with a loss of both motor driven AFW pump discharge flow paths to the steam generators. In most cases, the available AFW flowpaths will supply steam generators whose ARVs are unaffected and, where this is not the case, calculation WCNOC-CP-002 and E-1F9915 provide justification for acceptability. Based on the above discussion, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Decay Heat Removal						
PWROG 30	AFW Flow Diversion	Combination of spurious valve operations in the AFW pump discharge flowpaths to the steam generators	Scenario causes AFW flow diversion to a non-credited steam generator(s), challenging the Decay Heat Removal Function. A steam generator may be "non-credited" by the SSA for a number of reasons including unavailability of instrumentation, inoperability of steam dumps on that loop, etc.	ALHV0005 (ALFT0001), ALHV0007 (ALFT0007), ALHV0009 (ALFT0009) and/or ALHV0011 (ALFT0011) OR ALHV0006, ALHV0008, ALHV0010 and/or ALHV0012	Various	The feedwater check valves were re-located in RF17 and they are now upstream of the AFW tap. Therefore, the AFW flow will not divert to another steam generator. Calculation WCNOC-CP-002 analyzes possible scenarios that could lead to overcooling. The calculation, along with E-1F9910, shows that operators can mitigate an overcooling event from the control room. In particular, scenarios 2 and 3 in WCNOC-CP-002 investigate the effects of 2 ARVs failed open, pressurizer heaters off, pressurizer spray operating and maximum AFW flow. Based on the results, overcooling and return to criticality did not occur based on operator actions in the control room. Based on the above discussion, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Decay Heat Removal						
PWROG 31	AFW Pump Run Out	Spurious full opening of multiple AFW flow control and/or isolation valves	Scenario may cause AFW pump runout and inoperability, challenging the Decay Heat Removal Function. Note that this scenario may occur even without spurious operations if the fail-safe position of relevant valves is full open.	ALHV0005 (ALFT0001), ALHV0007 (ALFT0007), ALHV0009 (ALFT0009) and/or ALHV0011 (ALFT0011) OR ALHV0006, ALHV0008, ALHV0010 and/or ALHV0012	Various	See PWROG 30 comments, which are applicable to this scenario. E-1F9910 has analyzed the availability of AFW for fires in any fire area. There are no fire areas where a fire could cause runout of the credited AFW pump. At worse, runout may occur on the non-credited pump which is a commercial concern only. The credited pump and valves can be fully controlled from the control room. Restriction orifices are located in the pump discharge lines. Per discussion with the system engineer and review of system description M-00AL, these orifices are designed to limit AFW flow to 250 gpm and will prevent runout in the event the control valve fully opens. Based on the above discussion, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Decay Heat Removal						
PWROG 32	CST Diversion to Condenser	Spurious opening of valves between the Condensate Storage Tank (CST) and condenser hotwell	Scenario causes inadvertent draining of CST inventory to the condenser. This CST inventory becomes unavailable as an AFW source, challenging the Decay Heat Removal Function. Other CST draindown paths may exist. P&ID review required.	ADLV0079BA or ADLV0079BB	None	The CST draindown paths are not analyzed in the PFSSD analysis. The CST is the preferred AFW source because the water is clean. However, for PFSSD, the ESW system is the credited source. Therefore, drainage of the CST to the condenser will not adversely impact PFSSD. Based on the results of E-1F9910, the ESW system is available to supply the associated AFW pump in the event of a fire in any area. Therefore, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Decay Heat Removal						
PWROG 33	Excess Feed Flow to Steam Generator	Scenario can occur due to various combinations of spurious AFW pump starts, spurious opening (or failure to close) of valves in AFW pump discharge flowpaths, and spurious opening of MFW isolation valves with MFW pump(s) running.	Scenario causes RCS over-cooling and/or steam generator overfill, both challenging the Decay Heat Removal Function. RCS over-cooling can cause RCS shrinkage and low PZR level. Steam generator overfill can affect operability of turbine-driven AFW pump. Note that the spurious pump starting can occur for several reasons, including fire damage to control circuitry or a spurious ESFAS signal.	Same as PWROG 27 and 30 Plus PAL01A, PAL01B or PAL02 OR PAE01A or PAE01B fail to trip OR PAE02 spuriously starts and AEHV0102 and AEHV0103 spuriously open AND AEFCV0510 or AEFCV0550 and AEFV0039 or AEFCV0520 or AEFCV0560 and AEFV0040 or AEFCV0530 or AEFCV0570 and AEFV0041 or AEFCV0540 or AEFCV0580 and AEFV0042	A-15, A-23	Main feedwater is stopped by closing the main steam isolation valves (MSIVs) and stopping steam flow to the main feedwater pump (MFP) turbines. In fire areas A-15 and A-23, the MSIVs may not close and steam will continue to be delivered to the MFP turbines. A fire in A-15 and A-23 will not prevent closing the turbine driven main feed pump stop valves (FCFV0005 and FCFV0105). Therefore, main feedwater can be isolated if a fire occurs in any fire area. The main feedwater isolation valves (MFIVs) are included in the PFSSD design. Currently, they are included to evaluate and prevent AFW flow diversion. However, feedwater check valves have been moved and will prevent flow diversion from AFW so the MFIVs are not needed for this purpose. The MFIVs are still credited to prevent excessive feedwater flow. Main feedwater flow control valves and bypass valves are not included in the PFSSD analysis. If PAE02 spuriously starts and AEHV0102 and AEHV0103 open, then feedwater can be stopped by closing the MFIVs. All four MFIVs can be isolated in the event of a fire in all areas except A-15 and A-23. In these areas, PAE02 can be stopped from the control room. Since main feedwater can be isolated in the event of a single fire in all fire areas, this scenario is the same as PWROG 30. Therefore, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Decay Heat Removal						
PWROG 34	Steam Generator Blowdown	Spurious opening of, or failure to close, multiple series steam generator blowdown valves	Scenario causes drain down of steam generator inventory through the blowdown system, challenging the Decay Heat Removal Function. Scenario may screen if available AFW mass flow rate exceeds steam generator inventory mass loss rate through blowdown.	BMHV0001, BMHV0002, BMHV0003 or BMHV0004	A-6, A-13, A-15, A-16N, A-16S, A-21, A-23, A-27, C-22, C-23, C-30, C-33	Thermal Hydraulic analysis (WCNOC-CP-002) performed for PFSSD shows insignificant impact on SG inventory even with all 4 blowdown valves open. Therefore, no actions are needed to address this MSO scenario.
PWROG 35	Secondary Sample System	Spurious opening of steam generator sample valve(s) inside containment, AND Spurious opening of isolation valve(s) outside containment, AND Spurious opening of downstream sample valve(s)	Scenario causes drain down of steam generator inventory through the sample system, challenging the Decay Heat Removal Function.	N/A	None	Sample lines are isolated by a normally closed manual isolation valve downstream of the sample coolers. Therefore, this MSO scenario is not an issue at Wolf Creek.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Decay Heat Removal						
Expert Panel 8	AFW Flow Diversion	1/2 MDAFW Pumps Fails to Start AND MFW Isolation Fails	Scenario results in loss of decay heat removal capability due to flow imbalances created by attempting to feed all 4 SGs with a single MDAFW Pump.	PAL01A or PAL01B AND AEFV0039, AEFV0040, AEFV0042 or AEFV0042 AND AEFCV0510 or AEFCV550, AEFCV0520 or AEFCV0560, AEFCV0530 or AEFCV0570, AEFCV0540 or AEFCV0580	None	Feedwater check valves were moved in DCP 12792 to a location upstream of the AFW tap. Therefore, AFW flow cannot divert to another steam generator. Based on the that above discussion, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Pressure Control						
PWROG 36	RCS Pressure Decrease	Spurious opening of pressurizer spray valve(s), AND Inability to trip, or spurious operation of, RCP, AND Inoperability of PZR Heater(s)	Scenario causes a RCS pressure transient, challenging the RCS Pressure Control Function. Typical PFSS analyses address this issue; PRAs often consider scenario negligible since there is no real threat of core uncovery.	PBB01A AND BBPCV0455B OR PBB01B AND BBPCV0455C OR PBG04, PBG05A, or PBG05B AND BGHV8145 AND Pressurizer Heater Backup Groups A and B and Variable Group C Off	A-1, A-11, A-18, C-7, C-12, C-18, C-21, C-24, RB	The pressurizer heaters are not included in the PFSSD design. Calculation WCNOC-CP-002 shows that spurious operation or maloperation of the heaters will not adversely impact PFSSD. The pressure control system components and cables are included in the PFSSD design for analysis of potential spurious actuation of the pressurizer sprays and PORVs due to spurious actuation of the pressure control system. Based on WCNOC-CP-002, spurious operation of pressurizer sprays will not adversely impact PFSSD as long as the spray is stopped in 50 minutes. The pressurizer spray valves are air operated. Isolation of instrument air to containment will fail the spray valves closed. Valve KAFV0029, control room hand switch KAHIS0029 and associated cables are included in the PFSSD design to evaluate whether this valve is affected by a fire. This valve is unaffected by a fire in all areas listed except C-21. If a fire occurs in area C-21, valve KAV0201 can be manually closed within 50 minutes as documented in E-1F9900. Based on the above discussion, the pressurizer spray valves can be closed within 50 minutes in the event of a fire in any of the areas listed. Therefore, no further actions are required to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Pressure Control						
PWROG 37	RCS Pressure Increase	Spurious operation of multiple PZR heaters, AND Inoperability of pressurizer spray or auxiliary spray, AND Failure to open pressurizer PORVs	Scenario causes a RCS pressure transient, challenging the RCS Pressure Control Function. RCS pressure increase could cause PORV(s) and/or safety valve(s) to open.	Same as PWROG 36 Plus BBPCV0455A and/or BBPCV0456A fail to open	Various	Failure to open PORVs will cause this transient to challenge the pressurizer safety valves. Pressurizer heaters are not included in the PFSSD analysis, so they are assumed to fail in the worse condition. Pressurizer PORV failure to open is not analyzed in E-1F9910 because the desired position is closed. If overpressure occurs, the mechanical safety valves will cycle to prevent overpressure in the pressurizer. The safeties are not affected by a fire. See MSO scenario WCNOC 1 for discussion of RCS pressure increase combined with pressurizer overfill. Based on the above discussion, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
RCS Pressure Control						
Expert Panel 9	RCS Pressure Decrease	Spurious operation of pressurizer pressure master controller	Scenario causes an RCS pressure transient resulting in spurious SI actuation.	BBPC0455A (BBPT0455)	Various	This could be considered a single spurious scenario, but it was not addressed earlier and, therefore, is included here. Controller failing high would cause Pressurizer Heaters to turn off, Spray Valves to open, and PORV BBPCV0455A to open. The pressurizer pressure control system has been analyzed in E-1F9910. All potential spurious actuations have been evaluated. Calculation WCNOC-CP-002 evaluates spurious operation of the pressurizer sprays and heaters. Based on this calculation, pressurizer spray needs to be stopped within 50 minutes to prevent saturation conditions. See scenario PWROG 36 for a discussion about pressurizer sprays. Implementation of DCP 12944 along with License Amendment 193 ensures the pressurizer PORVs can be closed from the control room in the event of a fire in any area of the plant except the control room. Based on the above discussion, no further actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Reactivity Control						
PWROG 38	Inadvertent Boron Dilution	Unborated water supply to the RCS can occur due to combinations of the following: -Spurious start of reactor makeup pump(s) (supplies unborated water to the VCT), -Spurious opening of valves between reactor makeup pump(s) and VCT, -Spurious full opening of the reactor makeup flow control valve, -Spurious closure of the boric acid flow control valve	Scenario decreases RCS boron concentration, potentially causing reactivity increase, and challenging the Reactivity Control Function.	BGFCV0111A and BGFCV0110B or BGFCV0111B WITH PBL01A or PBL01B OR BGFCV0110A fails closed during auto makeup	A-8	The components listed are not included in the PFSSD analysis and have not been analyzed. The PFSSD lineup uses the borated RWST to provide makeup to the RCS. The reactor makeup pumps supply unborated water to the VCT through valve BGFCV0111A or BGFCV0110B. Both inlets are upstream of the VCT outlet valves. Therefore, closure of one of the VCT outlet valves (BGLCV0112B or BGLCV0112C) will prevent boron dilution per this MSO. Fire area A-8 is the only area where one of the VCT outlet valves may not close. With the reactor at full power, USAR Section 15.4.6.3 indicates approximately 1 hour is available between the time the reactor would trip due to reactivity insertion and the time re-criticality would occur. Therefore, there is a sufficient amount of time for operator action to mitigate this transient. CP 12316 addressed this MSO scenario. E-15000 (Setroute) was revised to add notes to control cables associated with pumps PBL01A and PBL01B to ensure that a fire in area A-8 will not prevent stopping these pumps from the control room. Therefore, there are no fire areas where this scenario would challenge PFSSD. Based on the above discussion, no further actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Reactivity Control						
PWROG 39	Fire Prevents Reactor Trip	Fire damage to RPS may prevent reactor trip. For example, hot shorts may prevent tripping of RPS MG sets.	Scenario results in insufficient shutdown margin and potential need for emergency boration. Note that this review may have already been performed for the disposition of Information Notice 2007-07.	SB102A and SB102B AND PG01902 OR PG02002 and PA0207 Fail to Open AND Failure of Manual Rod Insertion (SFHS0002) AND Failure of Emergency Boration (PBG04, PBG05A, PBG05B, PBG02A, PBG02B, and BGHV8104)	A-27	SB102A is for Bypass Breakers and SB102B is for Main Trip Breakers. IN 2007-07 is applicable to BWRs only. Wolf Creek did not evaluate this IN. Fire area A-27 contains both sets of reactor trip switchgear. A fire in this area may prevent a reactor trip using the reactor trip switches in the control room. If a fire occurs in area A-27, the reactor can be tripped by de-energizing the motor generator sets. This is done by opening breakers PA0106 and PA0207 using PGHIS0002 and PGHIS0003 in the control room. E-1F9910 documents the capability to open these breakers from the control room and shows there is no adverse impact by removing power from the loads supplied by these breakers. Based on the above discussion, no additional actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Reactivity Control						
Expert Panel 10	Malfunction of SGLCS	Spurious operation of SG Water Level control resulting in overfeed of SG	Scenario could cause reactor trip due to positive reactivity insertion.	AEFC0510 (AELC0519), AEFC0520 (AELC0529), AEFC0530 (AELC0539), and AEFC0540 (AELC0549)	A-15, A-23	The MFIVs are included in the PFSSD analysis and can be closed to prevent steam generator overfill. The AFW system has been fully analyzed in E-1F9910 and steam generator level instruments are available so operators can determine SG level. Fire in fire areas A-15 and A-23 could prevent closing the MFIVs. See PWROG 33 for further discussion. Based on the above discussion and the discussion in scenario PWROG 33, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Support Functions						
PWROG 40	CCW Header Isolation	CCW flow can be isolated via several combinations of spurious valve closures. Pertinent valves include: -pump discharge valves, -pump crosstie valves, -CCW heat exchanger inlet valves, -CCW heat exchanger outlet valves, -CCW heat exchanger crosstie valves, -Etc.	Scenarios cause failure of CCW function to provide cooling to safe shutdown loads.	EGHV0053 and EGHV0054 OR EGHV0015 and EGHV0016	A-16S <u>EGHV53</u> A-8, A-16S, A-19, A-22, C-9, C-12, C-18, C-21, C-24, C-31 <u>EGHV54</u> A-16S, A-21, C-10, C-11, C-17, C-22, C-23, C-30, C-33 <u>EGHV15</u> A-8, A-16N, A-19, A-22, C-18, C-21, C-24, C-31 <u>EGHV16</u> A-16S, A-21, C-22, C-23, C-30, C-33	Spurious closure of both valves on supply or return would impact RCP Thermal Barrier cooling. This loop also cools seal water heat exchanger which could affect charging pumps. Scenarios involving failures of the CCW surge tank makeup valves were discussed by the expert panel, but no scenarios could be identified which would result in loss of CCW flow. CCW has been fully analyzed in E-1F9910. Since one train of CCW is always operating, it may be necessary to swap to the opposite train if a fire occurs because the running train may be the affected train. DCP 12418 addressed this MSO scenario for a fire in A-27 that could have caused a loss of EGHV0016 and EGHV0054. Control room operator actions are available to mitigate loss of EGHV0053 in the event of a fire in A-16S. See E-1F9910. Based on the above discussion, no additional actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Support Functions						
PWROG 41	CCW to Redundant Loads	Spurious isolation of CCW cooling to redundant loads (including lube oil coolers, RHR heat exchangers, etc.)	Scenario isolates CCW cooling to redundant loads causing safe shutdown equipment inoperability of redundant trains. All credited CCW loads should be reviewed.	Loss of CCW to redundant RHR Heat Exchangers: EGHV0101 AND EGHV0102	None	The CCW system has been fully evaluated in E-1F9910. See PWROG 40 discussion. Based on E-1F9910, a fire in any area of the plant will have at least one train of CCW available to redundant loads. Therefore, no actions are needed to address this MSO scenario.
PWROG 42	CCW Flow Diversion to Non-Credited Loop	Flow diversion can occur via several combinations of spurious valve operations in the CCW pump discharge and CCW loop crosstie flowpaths. Review P&IDs to identify relevant combinations.	Scenario causes CCW flow to be diverted to the non-credited loop. This ultimately prevents CCW cooling of credited safe shutdown loads.	Potential failure to close of non-safety loop isolation EGHV0069A, EGHV0069B, EGHV0070A and/or EGHV0070B Spurious opening of SFP HX supply ECHV0011 or ECHV0012	Various	These valves are not included in the PFSSD analysis. Therefore, they are assumed to fail in the worse possible position in all fire areas. Potential diversion pathways through the CCW surge tank were discussed by the expert panel. It was decided that makeup valves EGLV0001 and EGLV0002 connect at the top of the tank making loss of CCW pump suction due to a diversion through this path impossible. Each CCW pump (2 per train) is designed to supply 100% of the heat loads in the safety and non-safety loops. The Radwaste loop supply valves close on low surge tank level, SIS or high flow. The containment loop supply valves close on CISB. See USAR Section 9.2.2. A DBA is not assumed concurrent with a fire. Therefore, the position of the Radwaste loop supply valves has no adverse impact on PFSSD. Likewise, spurious opening of the fuel pool cooling heat exchanger CCW valves will have no adverse

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Support Functions						
						impact on PFSSD. Spurious opening of EGHV0015 or EGHV0016 while operating the opposite train will cause CCW flow to be diverted to the non-credited train. Calculation EG-24 shows that if the opposite train of CCW is running and these valves are open, the operating CCW pump will have sufficient NPSH. Therefore, this is acceptable. Based on the above discussion, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Support Functions						
PWROG 43	ESW Header Isolation	ESW flow to credited loads can be isolated via several combinations of spurious valve closures. Pertinent valves include: -pump discharge valves, -pump crosstie valves, -ESW heat exchanger inlet valves, -ESW heat exchanger outlet valves, -ESW heat exchanger crosstie valves, -Etc. Review P&IDs to identify relevant combinations.	Scenario causes isolation of ESW, which can fail cooling to the CCW system and other safe shutdown components directly cooled by ESW (e.g., EDG cooling).	EFHV0037, EFHV0039 and EFHV0041 OR EFHV0038, EFHV0040 and EFHV0042	C-1	EFHV0037 and EFHV0038 are maintained at a minimum of 60% open by limit switch settings. This limit switch contact would have to be bypassed to result in total isolation of flow. Therefore, based on circuit review, two separate shorts would be required to allow full closure of either EFHV0037 or EFHV0038. E-1F9910 analyzes the potential for spurious operation of these components, including MSOs. Based on E-1F9910, at least one train of ESW is available to supply the required cooling flow to credited PFSSD equipment if a fire occurs in any fire area. The ESW system has been analyzed in E-1F9910 to ensure at least one train is available to supply PFSSD loads. There are no fire areas where a fire could affect both trains of ESW. These valves are all located in fire area C-1. Based on E-1F9910, the valves and cables are separated by 20 feet with no intervening combustibles and a suppression and detection system is installed in the area. This configuration meets Wolf Creek's licensing requirements. Based on the above discussion, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Support Functions						
PWROG 44	ESW to Redundant Loads	Spurious isolation of ESW cooling to redundant loads (including CCW heat exchangers, EDG cooling, etc.)	Scenario isolates ESW cooling to redundant loads causing safe shutdown equipment inoperability of redundant trains. All credited ESW loads should be reviewed.	Component Cooling Water: EFHV0051 or EFHV0059 AND EFHV0052 or EFHV0060 Instrument Air: EFHV0043 AND EFHV0044 Containment Coolers: EFHV0031, EFHV0032, EFHV0033, EFHV0034, EFHV0045, EFHV0046, EFHV0049 and/or EFHV0050	None	The ESW system has been analyzed in E-1F9910 to ensure at least one train is available to supply PFSSD loads. There are no fire areas where a fire could affect both trains of ESW, considering MSOs. Instrument air compressors are not credited for PFSSD. Therefore, spurious closure of EFHV0043 and EFHV0044 will not adversely impact PFSSD. Based on the above discussion, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Support Functions						
PWROG 45	ESW Flow Diversion to Non-Credited Loops/Systems	Flow diversion can occur via several combinations of spurious valve operations in the ESW pump discharge and loop crosstie flowpaths. Review P&IDs to identify relevant combinations.	Scenario causes ESW flow to be diverted to a non-credited loop or system. This ultimately prevents ESW cooling of credited loads.	SW Isolation Failure: EFHV0023 and EFHV0025 OR EFHV0024 and EFHV0026 CCW HX Supply Full Open: EFHV0051, EFHV0052, EFHV0059 or EFHV0060	A-19, C-1	Failure to isolate SW path can result in insufficient flow to the diesel generators in LOSP. Full opening of ESW supply to CCW HX can result in flow imbalances resulting in insufficient cooling. ESW diversion to the Spent Fuel Pool makeup line was discussed by the expert panel, but was excluded because it is isolated by manual valves. The ESW system has been analyzed in E-1F9910 to ensure at least one train is available to supply PFSSD loads. There are no fire areas where a fire could affect both trains of ESW, considering MSOs. Fire area A-19 has cables for EFHV0051, EFHV0052, EFHV0059 and EFHV0060. Train B ESW is credited. The cable damage to EFHV0060 (Train B) will not cause the valve to open. The cable damage to EFHV0052 (Train B) will not cause the valve to close. Therefore, this configuration is acceptable. Valves EFHV0023, 24, 25 and 26 are located in fire area C-1. Based on E-1F9910, the redundant valves and cables are separated by 20 feet with no intervening combustibles and a suppression and detection system is installed in the area. This configuration meets Wolf Creek's licensing requirements. Furthermore, check valves EFV0470 (Train A) and EFV0471 (Train B) are installed on the service water/ESW cross connect piping. The check valves will prevent ESW from diverting to service water.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Support Functions						
						Based on the above discussion, no actions are needed to address this MSO scenario.
PWROG 46	Emergency Power	Additional components load onto credited diesel generator	Scenario causes diesel generator overloading and inoperability. Note: Scenario very site specific. Interlocks may prevent this from occurring.	PEG01A and PEG01C OR PEG01B and PEG01D	A-27, C-5, C-6, C-9, C-10, C-11, C-15, C-17, C-23, CC-1, T-2, TURB, YARD	Review of diesel loading during the expert panel meeting could not exclude diesel overload if more than one CCW pump started during diesel sequencing. The fire areas listed are those where one or both trains of EDGs are credited. A review of E-1F9910 for each of these areas shows that neither CCW pump on the credited train will spuriously start. The credited train(s) is(are) unaffected by a fire in the applicable fire areas. Therefore, this MSO is not applicable to the CCW pumps. Based on the above discussion, a simultaneous spurious start of both CCW pumps on the credited train where loss of offsite power can occur is not credible. Therefore, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Support Functions						
PWROG 47	Emergency Power	Diesel generator overloading	Scenario causes diesel generator overloading and inoperability. Note: Scenario very site specific. Interlocks may prevent this from occurring. In addition to Scenario 46, overloading may also occur if proper load sequencing is bypassed via hot shorts, causing simultaneous loading of multiple components onto the EDG.	NF039A and NF039B	A-27 (A&B) C-5 (B) C-6 (A) C-9 (B) C-10 (A) C-11 (A) C-15 (A) C-17 (A) C-23 (A) CC-1 (A&B) T-2 (A&B) TURB (A or B) YARD (A or B)	Failure of load shed and/or bypass of load sequence can result in overload condition. The fire areas listed are those where one or both trains of EDGs are credited. The letters in parentheses indicate the EDG train that is required to be in service. In those areas where the diesel generator is credited, the associated train of PFSSD equipment is unaffected by a fire as documented in E-1F9910. Therefore, the credited equipment will not spuriously load to the bus and cause overloading of the EDG. E-1F9910 evaluates the load shedder/sequencer. In the areas where one diesel generator train is credited, the associated train load shedder/sequencer is unaffected. Therefore, the credited train EDG will not be affected by this MSO. Based on the above discussion, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Support Functions						
PWROG 48	Emergency Power	Diesel generator spuriously starts without service water cooling.	The fire causes the startup of the Emergency Diesel Generator and spurious isolation of ESW cooling (See Scenarios 42 & 44). Running the Emergency Diesel Generator with a loss of cooling water could trip and/or damage the diesel on high temperature.	KKJ01A and PEF01A OR KKJ01B and PEF01B	A-27 (A&B) C-5 (B) C-6 (A) C-9 (B) C-10 (A) C-11 (A) C-17 (A) C-23 (A) TURB (A or B) YARD (A or B)	Diesels can run for 30 minutes unloaded or 3 minutes loaded with no cooling. If diesel starts with no LOSP, cooling flow would initially be provided from the NSW system. Isolation of NSW is initiated by diesel output breaker closure. The fire areas listed are those that credit the emergency diesel generators because of a loss of off-site power. The letters in parentheses indicate the EDG train that is required to be in service. Calculation XX-E-013, Appendix 2 provides the loss of offsite power evaluation. Based on E-1F9910, the ESW train required to be operable to supply cooling to the diesel generator will not be affected by a fire in these areas. Based on the above discussion, no actions are needed to address this MSO scenario.
PWROG 49	Emergency Power	Non-synchronous paralleling of EDG with on-site and off-site sources through spurious breaker operations	Scenario causes damage to diesel generator by closing into a live bus out-of-phase. Note: Scenario very site specific. Interlocks may prevent this from occurring.	NB0109, NB0111 and NB0112 Or NB0209, NB0211 and NB0212	A-27 (A&B) C-5 (B) C-6 (A) C-9 (B) C-10 (A) C-11 (A) C-17 (A) C-23 (A) TURB (A or B) YARD (A or B)	Synch-check relay would have to be bypassed by the hot short to close a breaker out of phase. The fire areas listed are those that credit the emergency diesel generators because of a loss of off-site power. The letters in parentheses indicate the EDG train that is required to be in service. Calculation XX-E-013, Appendix 2 provides the loss of offsite power evaluation. In the fire areas listed, E-1F9910 has evaluated the availability of the credited EDG and found that cables that would cause non-synchronous paralleling of the credited EDG are not affected by

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Support Functions						
						the fire. Therefore, in the areas where one of the EDGs is credited, non-synchronous paralleling of the credited train is not credible. Another postulated spurious actuation could occur in areas where the EDGs are not credited but they spuriously start due to cable damage or a spurious SIS or undervoltage then another cable failure causes the EDG output breaker to close out of phase. The Train A EDG output breaker synch check relay contact can be bypassed by a hot short occurring within cable 11NEB10AB or a cable to cable hot short between cables 11NEB10AA and 11NEB10AD. This can occur in the following fire areas: C-9, C-12, C-18, C-21, C-24 and D-1. In all of these areas, Train B bus NB02 is unaffected. Therefore, if the Train A EDG spuriously starts and the output breaker closes out of sync, PFSSD is assured using Train B PFSSD equipment. The Train B EDG output breaker synch check relay contact can be bypassed by a hot short occurring within cable 14NEB11AB or a cable to cable hot short between cables 14NEB11AA and 14NEB11AD. This can occur in the following fire areas: C-10, C-11, C-17, C-22, C-30, C-33 and D-2. In all of these areas, Train A bus NB01 is unaffected. Therefore, if the Train B EDG spuriously starts and the output breaker closes out of sync, PFSSD is assured using Train A PFSSD equipment. Based on the above discussion, no actions are

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Support Functions						
						needed to address this MSO scenario.
Expert Panel 11	Loss of CCW Cooling	Spurious operation of CCW Temperature Control Valve could divert flow around HX resulting in loss of cooling.	Scenario could result in loss of RCP Thermal Barrier Cooling, loss of RHR cooling capability, and loss of additional equipment dependent on CCW.	EGTV0029 AND EGTV0030	None	The temperature control valves are included in the PFSSD analysis. These components have been fully evaluated and the impact on PFSSD is documented in E-1F9910. This is a single spurious scenario, as damage to a single valve causes the problem on the associated train. There are no fire areas where a single fire can cause damage or prevent operation of both temperature control valves. Valve is designed to fail close on loss of power. If power is available, valve will modulate. No failure mode can cause the valve to fail open. Based on the above discussion, no actions are needed to address this MSO scenario.
Expert Panel 12	Loss of Control Room HVAC	Spurious trip of both trains or isolation of cooling to both trains.	Scenario could result in spurious operation of various instrument loops due to overheating of instrument cabinets.	SGK04A AND SGK04B	None	Control room HVAC is included in the PFSSD analysis. These components have been fully analyzed in E-1F9910. The results show that control room air conditioning is available if a fire occurs in any fire area. There are no fire areas where a single fire can cause damage or prevent operation of both trains of control room HVAC. Based on the above discussion, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
PWROG 50	Generic - Loss of Pump Suction	Spurious isolation of various valves in pump suction flow path	Suction flow paths for all credited pumps should be reviewed for MSO scenarios causing loss of suction and pump inoperability. An example of a pump suction MSO was previously identified in which both the VCT outlets valve(s) and RWST outlet valve(s) spuriously close. Another example involves pump suction cross-connect valves. Three pumps may be supplied from a common suction header that includes several cross-connect valves. If two valves spuriously isolate, the pump drawing suction from the common header between the two isolated valves can	SI Pumps: EMHV8923A, and EMHV8807A and EMHV8807B, or EMHV8924, or EJHV8804A AND EMHV8923B and EJHV8804B Charging Pumps: See PWROG 10 AFW Pumps: LSP, and ALHV0030, ALHV0031, ALHV0032, and/or ALHV0033 OR LSP, and ESW Unavailable	Various	<u>SI Pumps</u> The SI pumps are not credited for PFSSD. Loss of suction to a running SI pump will not adversely impact PFSSD. <u>RHR Pumps</u> This is discussed in MSO Scenario Expert Panel 4. <u>AFW Pumps</u> A spurious LSP with ESW unavailable could cause a loss of suction to the AFW pumps. Also, any spurious closure of the CST to AFW valves will cause a loss of suction to the AFW pumps unless ESW is available and the ESW valve can be opened. All of the AFW components, including the LSP signals, are included in PFSSD. The potential for loss of suction to the pumps has been evaluated in E-1F9910 and there is no possibility that a fire will cause a loss of suction to the credited AFW pump. Therefore, this scenario is not an issue for the AFW pumps. <u>Charging Pumps</u> See MSO Scenario PWROG 10 <u>ESW Pumps</u> The ESW pumps take suction directly from the lake. There are no fire-induced scenarios that would cause a loss of ESW pump suction.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
			lose suction and become inoperable. The spurious operation of idle pumps after suction has been spuriously isolated should also be considered. Spurious pump starting can occur for several reasons, including fire damage to control circuitry or a spurious ESAFAS signal.			<u>CCW Pumps</u> The CCW system is a closed loop system with a surge tank maintaining NPSH on the pumps. Except for the CCW supply to the RHR heat exchanger, there are no motor operated valves in the safety loop that could spuriously close in the event of a fire. Also, the line from the pump suction to the surge tanks has no valve. Therefore, a fire will not cause a loss of suction to the CCW pumps. Also see PWROG 42 for discussion on CCW flow diversion to non-credited loop. Based on the above discussion, no actions are needed to address this MSO scenario.
PWROG 51	Generic - Pump Shutoff Head	Spurious isolation of pump discharge flow, AND Spurious isolation of recirculation valve(s)	Scenario causes pump operation at shutoff head and subsequent inoperability. All credited pumps should be reviewed for this scenario. Note that spurious starting of idle pump(s), in combination with isolation of discharge flow and recirculation, may cause inoperability of additional pumps.	RHR Pumps: Spurious SIS or Spurious start of pumps AND EJFCV0610 or EJFCV0611	A-8, A-27, C-21 <u>SIS</u> A-8, A-13, A-15, A-16 (N/S), A-17, A-18, A-23, A-27, C-21, RB <u>EJFCV0610 Close</u> A-8, C-9, C-12, C-18, C-21, C-24 <u>EJFCV0611 Close</u> A-8, A-16S, A-27, C-10, C-11, C-17, C-22, C-23,	<u>SI Pumps</u> The SI pumps are not credited for PFSSD. Therefore, failure of these pumps due to loss of recirc flow will not adversely impact PFSSD. <u>RHR Pumps</u> A spurious pump start at normal temperature and pressure will cause the pump to dead head against reactor pressure. Flow will re-circulate through the re-circ line unless the fire affects this path. Fire in A-8 and A-27 could challenge this scenario. In fire area A-8, both recirculation valves could be affected due to the flow switches being in this area. Therefore, the recirculation valves could go closed.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
			Spurious pump starting can occur for several reasons, including fire damage to control circuitry or a spurious ESAFAS signal.		C-30, C-33 <u>A RHR Pump Start</u> C-9, C-12, C-18, C-21, C-24 <u>B RHR Pump Start</u> C-10, C-11, C-17, C-22, C-23, C-30, C-33	If the SIS is spurious, the RHR pumps would be pumping against RCS pressure, in which case there would be no flow. Flow would re-circulate through the RHR heat exchanger and back to the RHR pump suction through the associated flow control valve. In A-27, Train B RHR is credited because Train A CCW is lost. EJFIS0611 could be affected, causing EJFCV0611 to close. Therefore, a fire in A-27 that results in this MSO could cause damage to both RHR pumps. In C-21, the Train B RHR system is unaffected. The Train A RHR pump could be damaged by this scenario but the Train B RHR pump would flow through the recirc line to maintain pump operability. <u>AFW Pumps</u> The AFW pumps re-circulate to the CST through normally open manual valves. There are no electrically operated valves in this flowpath so a fire will not cause damage to the AFW pumps due to isolation of the discharge valves. <u>Charging Pumps</u> See MSO Scenario Expert Panel 3 for discussion of loss of charging pump miniflow. Based on that discussion, this scenario is not an issue at Wolf Creek. <u>ESW Pumps</u> There are no valves in the ESW discharge flowpath that are susceptible to fire induced spurious

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
						operation. Electrically operated valves in the ESW system are discussed in other scenarios. If the ESW pumps start, the only way for the system to operate at no flow is if the return valves (EFHV0037 or EFHV0038) close. These valves are discussed in PWROG 43. At least one train of ESW is available for a fire in any area per E-1F9910. Screen wash valves EFHV0091 and EFHV0092 are included in the PFSSD design. These valves open when the ESW pump runs, providing flow in the system to protect the pump and to keep the screens clean. The credited train valve will open as required in the event of a fire in any area. <u>CCW Pumps</u> The CCW system is a closed loop. There are no possible failures that would prevent discharge flow to the safety loop. Therefore, this scenario is not applicable to the CCW Pumps. DCP 13615 was implemented to correct this MSO issue related to the RHR pumps. The DCP re-located EJFIS0611 from fire area A-8 to fire area A-4 and re-routed the cable and instrument tubing to avoid these areas. Consequently, a fire in A-8 or A-27 will not cause the spurious closure of EJFCV0611 and the B Train RHR pump will be unaffected.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
PWROG 52	Generic – Pump Outside Design Flow	Pump damage from operation outside design flow either at shutoff head or pump run-out conditions.	Scenario causes pump failure. Operation at shutoff head can occur, for example, if pump discharge flow spuriously isolates with the recirculation valves closed. Run-out can occur, for example, if the discharge header is at reduced pressure conditions. Note that spurious starting of idle pump(s), in combination with isolation of discharge flow and recirculation, may cause failure of additional pumps. Spurious pump starting can occur for several reasons, including fire damage to control circuitry or an inadvertent ESFAS signal.	All credited pumps.	None	Loss of discharge flow on all credited pumps is analyzed in MSO Scenario Expert Panel 13. Pump run-out for the AFW pumps is discussed in MSO Scenario PWROG 31. Charging pump run-out is not expected to occur because throttle valves on the BIT injection line will provide adequate back pressure. CCW pump run-out is not a concern because the CCW system is a closed loop system. RHR pump run-out will not occur due to flow orifices installed in the discharge line. ESW pump runout is not a concern because flow orifices and manual valve throttling provide necessary flow balance and backpressure in the system to prevent run-out. Based on the above discussion, this MSO scenario is not a concern at Wolf Creek.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
PWROG 53	Generic – Flow Diversion	Spurious operation of various valves causing flow diversion.	All credited flow paths should be reviewed for MSO scenarios that can divert flow away from desired location.	Various	Various	Flow diversion is addressed in other MSO scenarios. E-1F9910 analyzes all flow diversion paths for impact on PFSSD. Therefore, no actions are needed to address this MSO scenario.
Expert Panel 13	Generic - Pump Discharge Flow Path Isolation	Spurious isolation of various valves in pump discharge flow path	Discharge flow paths for all credited pumps should be reviewed for MSO scenarios that isolate those flow paths. One example is spurious isolation of two parallel charging injection valves. Another example involves pump discharge cross-connect valves. For example, three pumps may feed a common discharge header that includes several cross-connect valves. If two valves spuriously isolate, pump flow feeding	SI Pumps: EMHV8821A and EMHV8802A fails to open AND EMHV8821B and EMHV8802B fails to open	Various	<u>SI Pumps</u> The SI pumps are not credited for PFSSD. <u>RHR Pumps</u> A single spurious operation would cause a loss of RHR pump discharge flow. This is evaluated in E-1F9910. <u>AFW Pumps</u> AFW pump discharge flowpath MSOs are discussed in MSO Scenario PWROG 28. <u>Charging Pumps</u> Charging flow to the RCS is through the RCP seals or the BIT. MSOs would need to occur to impact both of these flow paths. E-1F9910 fully analyzes charging flow to ensure at least one RCS makeup path is available. There are no fire areas where charging flow is unavailable.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
			the common header between the two isolated valves will isolate.			<u>ESW Pumps</u> There are no valves in the ESW discharge flowpath that are susceptible to fire induced spurious operation. Electrically operated valves in the ESW system are discussed in other MSO scenarios. <u>CCW Pumps</u> CCW flow to the safety loop has no motor operated valves that could fail closed. CCW flow to the reactor auxiliaries could be affected by spurious closure of one valve and failure to open of another valve. This has been evaluated in E-1F9910 and in areas where CCW flow to the reactor auxiliaries is required, there are no areas where this can occur. Based on the above discussion, no actions are needed to address this MSO scenario.
PWROG 54	Loss of HVAC	Spurious isolation of HVAC to credited loads	Perform review to identify spurious failures that could cause isolation of HVAC to credited loads. Credited loads may include pump rooms, switchgear rooms, and rooms containing solid state control systems. Examples of spurious failures include spurious damper isolation	ESW: GDTZ0001A AND GDTZ0001C OR GDTZ0011A AND GDTZ0011C Diesels: GMTZ0001A AND GMHZ0009 OR		Diesel cooling is not required with outside air temperatures less than 78 degrees. However, since cooling is required for approximately 20% of the year, this scenario is applicable. The internal events PRA model only considers GMHZ0009 and GMHZ0019 for loss of combustion air, not loss of room cooling. E-1F9910 fully analyzes HVAC to credited PFSSD equipment. In all cases, room cooling is available to the credited equipment for fires in areas outside the control room. Based on the above discussion, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
			and spurious isolation of cooling flow to chillers.	GMTZ0011A AND GMHZ0019		
PWROG 55	Valve Inoperability	Spurious motor-operated valve operation, AND Wire-to-wire short(s) bypass torque and limit switches	General scenario is that fire damage to motor-operated valve circuitry causes spurious operation. If the same fire causes wire-to-wire short(s) such that the valve torque and limit switches are bypassed, then the valve motor may stall at the end of the valve cycle. This can cause excess current in the valve motor windings as well as valve mechanical damage. This mechanical damage may be sufficient to prevent manual operation of the			This scenario has been addressed for all valves credited for Control Room fire. For other valves, the PFSSD analysis (E-1F9910) considers prevention of damage to redundant trains. E-1F9910 considers multiple hot shorts with respect to motor operated valve control circuits. IN 92-18 has been analyzed for control room fires and modifications have been completed. For fires outside the control room, the credited train MOVs are either unaffected by the fire or are being modified as discussed in other MSO scenarios. Based on the above discussion, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
			valve. Scenario only applies to motor-operated valves. Note that this generic issue may have already been addressed during disposition of NRC Information Notice 92-18. This disposition should be reviewed in the context of multiple spurious operations and multiple hot shorts.			
PWROG 56	Fire-Induced Spurious ESFAS	Fire-induced spurious ESFAS signals (e.g., safety injection, containment isolation, etc), combined with other fire-induced failures, can adversely affect safe shutdown capability. An example of a fire-induced ESFAS signal is a fire causing open circuits on 2/3 main steam pressure instruments on one loop resulting in a spurious safety injection signal. ESFAS signals can result from open circuits, shorts to ground, and/or hot shorts. Fire-induced failure of instrument inverters may also cause spurious ESFAS signals. The plant should perform a systematic review to asses the potential for fire-induced		2/4 Low Pressurizer Pressure: BBPT0455, BBPT0456, BBPT0457, and BBPT0458 Low Steamline Pressure (2/3 of any of the	SIS A-8, A-13, A-15, A-16 (N/S), A-17, A-18, A-23. A-27, C-21, RB CSAS A-16N, A-17, A-18, A-27, C-21	Safety injection and containment spray initiators are included in the PFSSD design. E-1F9910 evaluates the impact on PFSSD due to spurious SIS and CSAS. Based on E-1F9910, operators can take action to mitigate these signals or the signals have no adverse impact on PFSSD. Other scenarios throughout this evaluation discuss spurious ESFAS coincident with other spurious actuations.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
		spurious ESFAS to adversely affect safe shutdown capability. Below are some examples.		following): ABPT0514, ABPT0515, ABPT0516 OR ABPT0524, ABPT0525, ABPT0526 OR ABPT0534, ABPT0535, ABPT0536 OR ABPT0544, ABPT0545, ABPT0546 High Containment Pressure (2/3) SIS: GNPT0934, GNPT0935, GNPT0936 High Containment Pressure (2/4) CSAS: GNPT0934, GNPT0935, GNPT0936,		

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
				GNPT0937		
PWROG 56a	RCS Makeup Pump Inoperability	Spurious safety injection signal, AND Spurious isolation of makeup pump suction	Safety injection signal starts multiple RCS makeup pumps. Fire causes makeup pump suction valves to fail closed. Scenario results in cavitation / inoperability of multiple RCS makeup pumps.	<u>RHR Pumps</u>: PWROG 56 AND BNHV8812A or BNHV8812B <u>Charging Pumps</u>: PWROG 56 AND BGLCV0112B or BGLCV0112C AND BGLCV0112D and BGLCV0112E	<u>SIS</u> A-8, A-13, A-15, A-16N/S, A-17, A-18, A-23, A-27, C-21, RB <u>Low RWST</u> A-19, A-20, A-22, A-27, C-21, F-1, F-2, F-5, F-7, RWST <u>BNHV8812A Spurious Close</u> A-1, A-8, C-9, C-12, C-18, C-21, C-24 <u>BNHV8812B Spurious Close</u> A-1, A-8, A-16S, A-27, C-10, C-11, C-17, C-22, C-23, C-30, C-33	Spurious closure of charging and SI pump suction valves has been addressed under MSO scenarios PWROG 10 and Expert Panel 13 where the MSO does not involve a spurious SIS. Also see MSO scenario Expert Panel 4 for an additional scenario affecting the RHR pumps. This scenario looks at Spurious SI with a corresponding loss of suction to the pumps. The SI causes the pumps to start and the fire could close the suction valves. <u>RHR Pumps</u> A spurious SIS coincident with a spurious low RWST level signal will start the RHR pumps and close the RWST to RHR suction valves. The RWST to RHR suction valves will close after the containment sump valves fully open as a result of the spurious low RWST level and SIS. This can occur in fire areas A-27 and C-21. A spurious SIS coincident with both RWST to RHR valves closing will damage both RHR pumps. This can occur in fire area A-8. In fire areas A-16S, A-

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
						27 and C-21 a spurious SIS with one RWST to RHR valve closure can occur. The other RWST valve would remain open except in the case of a spurious lo-lo RWST level as discussed in the previous paragraph. <u>Charging Pumps</u> Based on PWROG 10, there are no fire areas where a fire will cause a loss of all suction sources to the CCPs. A SIS will cause the RWST supply to the CCP header valves to open. At least one of these valves is unaffected by a fire anywhere in the plant. The SIS causes the VCT outlet valves to automatically close when the RWST valve is fully open so they are assumed closed in this scenario. DCPs 13612 and 13613 were implemented to address this MSO scenario. DCP 13612 re-routed the BNLT0932 cable to avoid fire areas A-27 and C-21 and prevent a spurious lo-lo RWST level in these areas. DCP 13613 installed fire resistive cable to protect the control circuit for valve BNHV8812B in fire area A-8. These modifications provide reasonable assurance that the MSO scenario will not occur at Wolf Creek.
PWROG 56b	Loss of All Seal Cooling	Spurious containment isolation signal isolates CCW to the thermal barrier heat exchangers for all RCPs, AND	Scenario causes loss of all RCP seal cooling and subsequent RCP Seal LOCA.	2/4 Containment Pressure HI-3 from GNPT0934, GNPT0935, GNPT0936, and GNPT0937 AND	A-16N, A-17, A-18, A-27, C-21	Fire areas listed are those where a fire could cause a spurious CSAS and spurious CISB which would isolate the CCW flow to the RCPs, including the thermal barriers. A review of E-1F9910 for each of these areas shows that RCP seal injection is not affected if a fire occurs. Therefore, a fire cannot cause a simultaneous CISB and failure of seal injection.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
		Spurious isolation of seal injection header flow		BGFCV0462 and BGFCV0121 OR BBHV8351A, BBHV8351B, BBHV8351C and/or BBHV8351D		Based on the above discussion, no actions are needed to address this MSO scenario.
PWROG 56c	Loss of All Seal Cooling	Spurious containment isolation signal isolates CCW to the thermal barrier heat exchangers for all RCPs, AND Spurious opening of charging injection valve(s) causing insufficient flow to seals	Scenario causes loss of all RCP seal cooling and subsequent RCP Seal LOCA.	2/4 Containment Pressure HI-3 (CISB) from GNPT0934, GNPT0935, GNPT0936, and GNPT0937 AND EMHV8801A or EMHV8801B AND EMHV8803A or EMHV8803B	<u>CISB</u> A-16N, A-17, A-18, A-27, C-21 <u>SIS</u> A-8, A-13, A-15, A-16 (N/S), A-17, A-18, A-23, A-27, C-21, RB <u>EMHV8801A</u> A-8, A-11, A-18, C-18, C-21, C-24 <u>EMHV8801B</u> A-21, C-22, C-30, C-33 <u>EMHV8803A</u> A-8, A-11, A-18, C-18, C-21, C-24 <u>EMHV8803B</u> A-21, C-22, C-30, C-33	See MSO Scenario PWROG 2 for discussion about flow diversion in the event of spurious opening of the BIT flowpath. Per this discussion, there will be sufficient flow to the RCP seals if the BIT flowpath opens. A CISB will close the CCW valves that supply cooling to the thermal barriers. A SIS will open the BIT flowpath valves and start the CCPs. Damage to certain cables for the EM valves will cause the valves to open. The BIT flowpath will open if either EMHV8801A or EMHV8801B open and EMHV8803A when operating Train A CCP or EMHV8803B when operating Train B CCP. A fire in the following areas could open the BIT flowpath and close the CCW to RCP flowpath due to a simultaneous SIS and CISB:

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
						A-16N, A-17, A-18, A-27, C-21 A fire induced SIS coincident with a CISB could cause this scenario to occur. A fire in some of these areas could prevent stopping the RCPs from the control room. If all seal cooling is lost and the RCPs continue to run, a seal LOCA can occur. However, as discussed in PWROG 2, there will be sufficient flow to the RCP seals to maintain seal cooling. Another possibility for this scenario is a CISB with the fire damaging the control circuits for the BIT valves. A fire in the following areas could cause a spurious CISB with opening of a BIT flowpath due to valve cable damage: A-18, C-21 In both of these areas, the A Train BIT flowpath opens coincident with a CISB. Based on E-1F9910, a fire in these areas credits the B Train CCP. The B Train BIT flowpath valves will not spuriously open and CCP flow will be directed to the RCP seals. Therefore, if the fire causes a CISB and damages cables for the BIT valves, causing the valves to open, PFSSD is assured and seal flow is maintained. Based on the above discussion, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
PWROG 56d	RWST Drain Down	Spurious high containment pressure on multiple channels causing spurious containment spray signal	Scenario causes a pumped RWST drain down via the containment spray pumps and containment spray ring.	2/4 Containment Pressure HI-3 from GNPT0934, GNPT0935, GNPT0936, and GNPT0937	A-16N, A-17, A-18, A-27, C-21	This scenario is evaluated in E-1F9910. Operators can mitigate this scenario from the control room by stopping the pumps. Therefore, no actions are needed to address this MSO scenario.
PWROG 56e	PORV(s) Open	Spurious high pressurizer pressure on multiple channels causes high pressurizer pressure signal	Spurious high pressurizer pressure signal causes PORV(s) to open and challenges the RCS Inventory and Pressure Control Functions	BBPT0455 AND BBPT0456	Various	E-1F9910 analyzes the pressurizer pressure control system components (except the heaters) for PFSSD impact. Also, the pressurizer PORVs can be closed from the control room if they spuriously open as documented in E-1F9910. Based on the above discussion, no actions are needed to address this MSO scenario.
PWROG 56f	RCS Makeup Pump Failure	Spurious Recirculation Actuation Signal (RAS) causes pumps to start and align to dry containment sump	Spurious Recirculation Actuation Signal (RAS) starting and aligning pumps to a dry containment sump.	RHR Pumps Containment Sump Valves	Same as PWROG 56a	This scenario is discussed in MSO Scenario PWROG 56a. Wolf Creek does not have a RAS. Rather, re-circulation mode is automatically initiated when a low level occurs in the RWST coincident with a SIS. Based on the above discussion, no actions are needed to address this MSO scenario.

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
Expert Panel 14	Loss of Containment Isolation	Various combinations of spurious operation of valves credited for containment isolation.	Scenario could cause uncontrolled release of fission products following core damage.	Penetration 32: LFFV0095 AND LFFV0096 Penetration 65: GSHV0020 AND GSHV0021 Penetration 160: GTHZ0011 AND GTHZ0012 Penetration 161: GTHZ0004 AND GTHZ0005	None	These valves are not included in the PFSSD analysis. Failure of the containment isolation function does not adversely impact PFSSD since a DBA is not assumed concurrent with a fire. Based on the above discussion, no actions are needed to address this MSO scenario.
WCNOC 1	RCS Pressure Increase AND Pressurizer Overfill	Spurious operation of multiple PZR heaters, AND Inoperability of pressurizer spray or auxiliary spray, AND Failure to open pressurizer PORVs, AND	Scenario could cause pressurizer overfill and overpressure, causing the mechanical safetys to open and pass water.	Spurious operation of multiple PZR heaters AND Inoperability of pressurizer spray or auxiliary spray AND Failure to open pressurizer PORVs	Various	Scenario causes an increase in RCS pressure that causes the mechanical safetys to open due to the failure of both pressurizer PORVs to open. In addition, the scenario causes pressurizer overfill due to letdown and excess letdown failing closed. This would cause water to pass through the safetys which they are not designed for. NEI 00-01, Rev. 2, Section 4.4.3.4 states that when evaluating combinations of MSO scenarios, consideration of more than four component failures is beyond the required design basis for MSO scenarios. Furthermore, NRC RG 1.189, Rev. 2, Section 5.3.1.1 states that the approach outlined in Chapter 4 of NEI 00-01 provides an acceptable methodology for the identification of multiple

Scenario ID	Scenario	Scenario Description	Notes	Included Equipment	Applicable Fire Areas at WCNOC?	Comments
Other						
		Letdown spuriously isolates, AND Excess Letdown spuriously isolates.		AND BGLCV0459 or BGLCV0460 AND BGHV8153A or BGHV8154A AND BGHV8153B or BGHV8154B AND BBHV8157A or BBHV8157B		spurious actuations. The scenario identified here requires a number of equipment malfunctions, categorized as follows: 1. Pressurizer heaters fail on 2. Pressurizer spray fails off 3. Pressurizer PORVs (2) fail closed 4. Letdown isolation valve (1) fails closed 5. Excess letdown valves (2) fail closed In this scenario, RCS makeup is approximately 32 gpm through the RCP seals. No other makeup flowpaths are functioning. Two steam generator ARVs are available for cooldown. Calculation AN-96-016 shows that the RCS can be cooled using only one S/G and one ARV following a reactor trip. Decay heat following a reactor trip is approximately 150 MW. The pressurizer heaters total approximately 1.8 MW but are not modeled in this calculation. Since one ARV can cool the RCS considering decay heat only, two ARVs can cool the RCS considering all three heater banks operating. In addition, if letdown or excess letdown are available, the 32 gpm makeup can be offset to prevent an overfill condition. Based on the above discussion, any combination of four individual component failures for this scenario can be mitigated using available PFSSD equipment as described above. Therefore, no actions are needed to address this MSO scenario.