Nuclear Operating Company

South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

November 20, 2009
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10 CFR 50.90
10 CFR 50.91

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

South Texas Project
Units 1 & 2
Docket Nos. STN 50-498, STN 50-499
Response to Request for Additional Information
Regarding License Amendment Requests for Deviation from
Fire Protection Program Requirements (TAC Nos. ME0824, ME0825, ME1389, ME1390)

Reference: 1. Letter from G. T. Powell, STPNOC, to NRC Document Control Desk dated February 3, 2009, "License Amendment Request for Deviation from Fire Protection Program Requirements" (NOC-AE-08002366)
2. Letter from G. T. Powell, STPNOC, to NRC Document Control Desk dated March 3, 2009, "License Amendment Request for Deviation from Fire Protection Program Requirements (Fire Area 27)" (NOC-AE-09002395)

In the referenced letters, STP Nuclear Operating Company (STPNOC) submitted license amendment requests for deviation from the South Texas Project Fire Protection Program requirements. This submittal responds to NRC questions regarding these requests received by electronic mail on September 4, 2009.

There are no new commitments in this submittal. If you have any questions, please call Ken Taplett at 361-972-8416 or me at 361-972-7566.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on November 23, 2009
Date

G. T. Powell
Vice President, Engineering

Enclosure: STPNOC Response to Request for Additional Information

A006
NRR

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Enclosure

STPNOC RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Attachments:

1. **Lay-out Drawing of Fire Area 27**

2. **Safe Shutdown Manual Action Timelines for Fire Areas 27 and 31.**

STPNOC RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

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Response to Request for Additional Information
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The following information was requested by Mohan Thadani, NRC, Senior Project Manager, to STP Nuclear Operating Company (STPNOC) via electronic mail on September 4, 2009. The STPNOC response to each request for information is provided below. The request for information refers to the following two referenced license amendment requests.

1. Letter from G. T. Powell, STPNOC, to NRC Document Control Desk dated February 3, 2009, "License Amendment Request for Deviation from Fire Protection Program Requirements" (NOC-AE-08002366)

2. Letter from G. T. Powell, STPNOC, to NRC Document Control Desk dated March 3, 2009, "License Amendment Request for Deviation from Fire Protection Program Requirements (Fire Area 27)" (NOC-AE-09002395)

NRC Request for Information RAI-01 – Circumstances for Review

Sections 1.0 and 2.0 of the requests contain descriptions of the proposed operator manual actions and deviations from the Fire Protection Program but do not contain a discussion of why STP is unable to meet the requirements of III.G.2 and why a deviation from the Fire Protection Program requirements is necessary.

Provide a justification of the circumstances that warrant the consideration of these license Amendments. Include a technical justification of how the proposed changes affect safe shutdown capabilities and how the proposed means of compliance are effective in mitigating the affects of changes.

STPNOC Response:

The cabling for redundant safe shutdown trains in Fire Areas 31 and 27 does not meet the separation requirements of Section III.G.2 of Appendix R of 10 CFR 50. In order to meet the requirements of III.G.2, a costly plant modification would be required (preliminary estimates range from one to two million dollars). As an alternative, STP proposes the use of feasible and reliable operator manual actions (OMA). In addition, the likelihood that an actual fire will

damage the redundant cables of concern is low and sufficient defense-in-depth fire protection features exist to justify the use of OMAs.

A deviation from the Fire Protection Program requirements is necessary because substituting OMAs for the protection described in III.G.2 is considered an adverse effect on the ability to safely shut down. Therefore, prior approval by the NRC is required in accordance with the South Texas Project (STP) Units 1 and 2 license conditions.

The STP Fire Protection Program (FPP) is described in the Fire Hazards Analysis Report (FHAR). Although STP is not an Appendix R plant, the FHAR states that STP will meet the requirements of 10 CFR 50, Appendix R, Section III.G.2 except for deviations from those requirements that have been approved by the NRC. STPNOC requests approval to deviate from these requirements, as specified below, to allow the performance of OMAs in lieu of meeting separation requirements to protect cables from fire damage that could prevent the operation or cause mal-operation of safe shutdown functions. The OMAs provide an equivalent level of protection and assure that the unit can be safely shut down in the event of a fire.

The OMAs to reestablish charging capability to the reactor coolant system are required within two hours of the fire event. These OMAs are feasible and can be reliably performed with a time margin of 61 minutes (see Fire Area 31, February 3, 2009 request) and 46 minutes (see Fire Area 27, March 3, 2009 request).

A justification of the circumstances that warrant the consideration of these License Amendments and a technical justification of how the proposed changes affect safe shutdown capabilities and how the proposed means of compliance are effective in mitigating the effects of changes is provided in more detail in the response to RAI-02 below. References 1 and 2 provide justification that the OMAs are feasible and can be reliably performed. The OMAs are appropriate to compensate for the reduction in protection required by the STP licensing basis.

The performance of the OMAs are a cost effective resolution to the deviation from the STP FPP and provides reasonable assurance that the plant can safely shut down in the event of a fire in either Fire Area 31 or Fire Area 27.

NRC Request for Information RAI-02 – Regulatory Deficiency

Section 2.0 of the requests provides background regarding the change but does not state, specifically, which criteria of III.G.2 are not met.

Provide a detailed description of the deficiencies that exist with regard to fire detection, suppression, intervening combustibles and spatial separation and explain how the deficiencies are mitigated with other forms of defense-in-depth measures. For example, if the 20-ft spatial separation between redundant equipment trains is not provided, provide a description of the separation that is provided and a justification for how the established level of safety and protection is maintained.

The licensee's response should also include a technical explanation to justify how the proposed methods will result in a level of protection that is consistent with that intended by III.G.2. For example, demonstrate that defense-in-depth is provided such that operators are able to safely and reliably shut down the plant from the control room. Note that it is the Nuclear Regulatory Commission (NRC) staff's position that operator manual actions alone, regardless of their feasibility and reliability, do not meet the underlying purpose of the rule without specific consideration of the overall defense-in-depth methodology in place in a particular fire area.

STPNOC Response:

A detailed description of the deficiencies that exist with regard to intervening combustibles and spatial separation are provided below by Fire Area.

Fire Area 31 (Reference 1)

In the event of a fire in Fire Area 31, the STPNOC fire safe shutdown analysis credits a charging pump for providing makeup to the reactor coolant system to ensure that boron concentration is adequate upon entry into MODE 4 (Hot Shutdown) to achieve and maintain safe shutdown. Each South Texas Project (STP) unit has two centrifugal charging pumps. The safe shutdown function associated with this amendment request is to re-align the suction water source from the volume control tank (VCT) to the refueling water storage tank (RWST). This is done with motor-operated valves.

Control and solid state protection system (SSPS) cables for operation of the motor-operated suction valves for each charging pump are routed through Fire Area 31. The redundant cables are not separated by 3-hour rated fire barriers as required by Section III.G.2 of Appendix R of 10 CFR 50. When a 3-hour fire barrier is not provided, Section III.G.2 allows alternate protection of redundant trains by a horizontal separation of more than 20 feet with no intervening combustibles or fire hazards, or by a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.

The redundant SSPS cables for the charging pump suction valves from the VCT outlet valves (CV-MOV-0112B and CV-MOV-0113A) and the redundant SSPS cables for the charging pump suction valves from the RWST (CV-MOV-0112C and CV-MOV-0113B) have greater than 20 feet separation, but intervening combustibles exist in the form of cabling in other trays between the redundant cables. There are no ignition sources in this fire area other than the cabling running through the area. Ionization-type fire detectors are provided throughout the fire area. A ceiling mounted area coverage automatic wet pipe sprinkler system is installed in the fire area.

The redundant control cables for the charging pump suction valves from the RWST and the redundant control cables for the charging pump suction valves from the VCT outlet have approximately 3 feet separation. An automatic wet pipe sprinkler system and fire detectors are

within 5 feet of these cables. There are no ignition sources in this fire area other than the cabling running through the area.

The analysis assumes that the cabling for the redundant trains is damaged by fire in the fire area. However, the fire safe shutdown analysis for re-aligning the charging pump is not dependent upon protecting the cables for the charging pump suction valves. The analysis credits the performance of OMAs to de-energize the cabling and reposition the valves from areas remote from the fire area. Reference 1 provided an analysis to justify that the OMAs can be performed with sufficient time margin to meet the safe shutdown functions credited by the thermal-hydraulic analysis.

Fire Area 27 (Reference 2)

The lay-out drawing of Fire Area 27 is provided as Attachment 1 to this Enclosure.

In the event of a fire in Fire Area 27, the STPNOC fire safe shutdown analysis also credits a charging pump for providing makeup to the reactor coolant system to ensure that boron concentration is adequate upon entry into MODE 4 (Hot Shutdown) to achieve and maintain safe shutdown. The suction source for the charging pump is re-aligned from the VCT to the refueling water storage tank (RWST).

Power and control cables for motor-operated suction valves for each charging pump are also routed through Fire Area 27. The redundant cables for the charging pump suction valves from the VCT outlet (CV-MOV-0112B and CV-MOV-0113A) and the redundant cables for the charging pump suction valves from the RWST (CV-MOV-0112C and CV-MOV-0113B) meet the Section III.G.2 separation criteria with the exception of Fire Zone Z127. In Fire Zone Z127, the redundant cables are located within 3 feet of one another. All the cables in this fire zone are installed in steel conduits. There are no other ignition sources in the zone except for lighting systems that could generate an electrical arc.

Fire Zone Z127 has limited combustibles primarily composed of an electrical panel, plastic and wire insulation in devices such as instrumentation, exit signs, detectors, lubricating oil, grease and limited transient combustibles. The fire loading has a fire severity of 0.33 minutes. This fire zone has ionization-type fire detectors but does not have an automatic fire suppression system.

The flow path from the charging pump discharge to the reactor coolant system credited in the fire safe shutdown analysis is dependent on the Train B charging pump discharge motor-operated valve (CV-MOV-8377B) and seal water injection valve (CV-HCV-0218).

The cabling for CV-MOV-8377B is located in Fire Zone Z127. The fire safe shutdown analysis assumes that the mechanical portion of motor-operated valve CV-MOV-8377B is not damaged by fire. Valve CV-MOV-8377B is in a separate valve cubicle room with solid concrete walls within Fire Zone Z127 (see Attachment 1). The cabling to valve CV-MOV-8377B is in steel conduit. With essentially no ignition source and the very low combustible loading in this zone, there is no credible fire scenario that would cause this normally-open valve to shut. For

additional assurance, an operator enters Fire Area 27 after a fire in this area is extinguished to verify or re-open CV-MOV-8377B. Reference 2 provides an analysis justifying the feasibility and reliability of this OMA.

The circuitry for the air-operated solenoid valves to operate CV-HCV-0218 is located in Fire Area 27. Valve CV-HCV-0218 is located in Fire Zone Z127 in another separate valve cubicle room with solid concrete walls (see Attachment 1).

The fire safe shutdown analysis assumes that the mechanical portion of the valve is not damaged by fire. The fire safe shutdown analysis for aligning the charging path to the reactor coolant system is not dependent upon protecting the cables. The analysis assumes that the cabling and the circuitry in Fire Area 27 are damaged by fire. As an alternative, OMAs are proposed. Reference 2 provided an analysis to justify that the OMAs can be performed with sufficient time margin to meet the safe shutdown thermal-hydraulic analysis.

The following discussion explains how the deficiencies, described above for Fire Area 31 and Fire Area 27 are mitigated with other forms of defense-in-depth measures.

Defense-in-Depth

The concept of defense-in-depth, described in 10 CFR Part 50, Appendix R, applies to protection in fire areas important to safety, with the following three objectives:

1. Prevent fires from starting;
2. Detect rapidly, control, and extinguish promptly those fires that do occur; and
3. Provide protection for structures, systems, and components (SSCs) important to safety so that a fire that is not promptly extinguished by fire suppression activities will not prevent the safe shutdown of the plant.

Fire Prevention

The objective of fire prevention is not affected by the use of an operator manual action. The area of the plant, where the fire could occur that would require the manual actions to be performed, has combustible loading allowances and limitations on hot work or other activities that are similar to other plant areas.

Detect, Control, and Extinguish Fires

This objective is also not affected by the use of an operator manual action.

Fire Area 31 consists of a single fire zone that is equipped with ionization detectors to provide early warning to facilitate manual fire fighting. Alarm annunciation is provided locally and in

the control room. A ceiling mounted area coverage automatic wet pipe sprinkler system is installed throughout the fire zone to aid in cooling and controlling the fire until manual suppression can be achieved. In the event that fire did occur in Fire Area 31, fire suppression equipment (hose stations and fire extinguishers) are available to the fire brigade.

Fire Area 27 consists of multiple fire zones each equipped with ionization detectors to provide early warning to facilitate manual fire fighting. Alarm annunciation is provided locally and in the control room. Ceiling mounted area coverage automatic wet pipe sprinkler systems are installed in zones of concentrated cabling to aid in cooling and controlling the fire until manual suppression can be achieved. In the event that a fire occurs in Fire Area 27, fire suppression equipment (hose stations and fire extinguishers) are available to the fire brigade.

STP maintains a dedicated on-site fire brigade consisting of a minimum of five members per shift. Brigade members are trained to respond to and combat fires wherever they may occur on site. Fire drill training for plant areas in proximity to this fire zone indicates that fire brigade response to a fire is expected to be timely, with entry into the affected area within 15 to 30 minutes of initial alarm.

Protect SSCs so that Fires Will Not Prevent Safe Shutdown

The objective of protecting the cabling to the SSCs is not fully met. The SSCs described above must be operated locally by OMAs.

Existing fire protection regulations rely on passive fire protection through fire barriers that have a high level of reliability to prevent the damage to redundant trains required for fire safe shutdown. The cables in question are not separated by a rated fire barrier. Thus, defense-in-depth is reduced.

In Fire Area 31, the redundant SSPS cables for the charging pump suction valves from the VCT outlet (CV-MOV-0112B and CV-MOV-0113A) have greater than 20 feet separation. Intervening combustibles exist in the form of cabling in other trays between the redundant cables. The redundant control cables for the charging pump suction valves from the RWST (CV-MOV-0112C and CV-MOV-0113B) and the redundant control cables for the charging pumps suction valves from the VCT outlet have 3 feet separation. There are no ignition sources in this fire area other than the cabling running through the area. The SSCs required to provide the safe shutdown function are the motor-operated valves. These valves are not located in Fire Area 31. Damage to the cabling by fire effects will prevent remote operation of these valves but will not adversely impact achieving safe shutdown. Analysis has demonstrated that the OMAs are feasible and reliable so that the valves can be manually repositioned in sufficient time to achieve safe shutdown. A fire in Fire Area 31 will not prevent safe shutdown.

In Fire Area 27, the cables for the two redundant VCT outlet motor-operated valves and the cables for the two redundant charging pump suction valves from the RWST meet III.G.2 circuit separation criteria in FA 27 with the exception of Fire Zone Z127 where the cables are located adjacent to one another. Fire Zone Z127 has very few combustibles, such that the loading has a

fire severity of 0.33 minutes. The SSCs required to provide the safe shutdown function are the motor-operated valves. These suction valves (i.e. VCT and RWST) are not located in Fire Area 27. Damage from fire effects to the cabling will prevent remote operation of these valves but will not adversely impact achieving safe shutdown. Analysis has demonstrated that the OMAs are feasible and reliable so that the valves can be manually repositioned in sufficient time to achieve safe shutdown.

In addition, the cabling for CV-MOV-8377B and the circuitry for the air-operated solenoid valves to operate CV-HCV-0218 are located in Fire Area 27. Damage from fire effects to the air solenoid circuitry will not prevent removing power from the solenoids and failing valve CV-HCV-0218 open.

Motor-operated valve CV-MOV-8377B is located in Fire Zone Z127 within Fire Area 27. The OMA to verify or reposition this valve is performed 60 minutes after the detection of the fire. The limiting fire duration is less than 25 minutes for typical combustible loading in this fire area and less than 60 minutes for the maximum permissible combustible loading. Fire Zone Z127 has a fire severity of 0.33 minutes. The fire zone boundaries within Fire Area 27 are heavy concrete. Most zone boundaries contain 3-hour rated fire doors with the exceptions as discussed in the response to RAI-04. These features provide significant obstructions that will inhibit zone-to-zone fire propagation. The cabling to valve CV-MOV-8377B is in steel conduit. With essentially no ignition source and the very low combustible loading in this zone, there is no credible fire scenario that would cause this normally-open valve to shut. For additional assurance, an operator is required to re-enter Fire Area 27 after a fire in this area is extinguished to verify or re-open CV-MOV-8377B. A fire will not damage the mechanical parts of valve CV-MOV-8377B. Therefore, it can be repositioned, if required, when Fire Zone Z127 is re-entered.

Air operated valve CV-HCV-0218 is also located in Fire Zone Z127. A fire will not damage the mechanical parts of this valve due to the limited combustibles in the room.

Conclusion

With the defense-in-depth described above, there remains a low likelihood that a fire could prevent the restoration of charging. Feasible and reliable OMAs are proposed to provide assurance that fire safe shutdown conditions can be achieved. Analysis has demonstrated that the OMAs are feasible and reliable so that the valves can be put in the required position (with sufficient time-margin) to achieve safe shutdown. Attachment 2 provides the validated safe shutdown manual action timelines for Fire Areas 27 and 31.

NRC Request for Information RAI-03 – Ensuring That One of the Redundant Trains Is Free of Fire Damage

Criterion 4 of Section 3.0 of the February 3, 2009, request and Criterion 4 of Section 3.3 of the March 3, 2009, request state that the STP analysis demonstrates that at least one path of safe shutdown equipment is maintained free from a fire. Criterion 2 of Sections 3.2 and 3.3 of the March 3, 2009 request, and Criterion 2 of Section 3.0 of the February 3, 2009 request state that the analysis performed by STP assumes that all systems and components in the fire area are lost due to fire.

These statements are contradictory and should be clarified. If redundant equipment is co-located in a fire area and all of the equipment in that fire area is assumed lost during a fire event, the resulting condition would be inconsistent with III.G.2, which states that measures must be taken to ensure that one of the redundant trains remains free of fire damage. Furthermore, the use of OMAs, in lieu of the three options provided in III.G.2, is not explicitly included as a means of compliance with III.G.2.

Clarify the statements made in the requests about whether redundant trains remain free of fire damage during a fire event and provide a technical justification to support the assumptions made in the analysis.

STPNOC Response:

The STP fire safe shutdown analysis does assume that all systems and components in the fire area are lost due to fire as stated in Criterion 2 of Sections 3.2 and 3.3 of the March 3, 2009 request, and Criterion 2 of Section 3.0 of the February 3, 2009.

Criterion 4 of Section 3.0 of the February 3, 2009 request and Criterion 4 of Section 3.3 of the March 3, 2009 request does state that the STP analysis demonstrates that at least one path of safe shutdown equipment is maintained free from a fire with the exceptions as stated. The exceptions are the reason for the License Amendment Requests asking for a deviation from the STP FPP requirements committed to in the STP licensing basis.

The use of OMAs in lieu of meeting Section III.G.2 were previously approved for STPNOC by License Amendments 186 and 173 (ML082280465 and ML082280472).

NRC Request for Information – RAI-04 Other Evaluations

Fire areas may have other license amendments or engineering evaluations that affect fire protection systems or safe shutdown capabilities.

Provide a discussion of any other amendments or evaluations that impact this request in any way and a justification for why such additional impact in conjunction with the proposed changes should be considered acceptable.

STPNOC Response:

Similar OMAs that are requested by References 1 and 2 have previously been approved for Fire Area 32 by License Amendments 186 and 173 (ML082280465 and ML082280472).

The following deviations from Codes and Standards for Fire Areas 31 and 27 were approved for STP during initial licensing. These deviations are documented in the STP Fire Hazards Analysis Report. Although these deviations do not impact the changes proposed in References 1 and 2, they are provided for your information.

Fire Area 31 (Reference 1)

Deviation

Penetration seals and/or dampers in Fire Area boundaries are unrated. Exterior walls and/or ceiling are non-rated. Doors in Fire Area boundaries are unlabeled.

Justification

Floors, walls, and ceilings (including penetrations) which separate fire areas have either a fire resistance rating of 3 hours or meet the following criteria:

Rated penetration seals and HVAC dampers are not provided when the fire area boundaries communicate with an area of low in-situ combustible loading. It is unlikely that a fire would propagate through the non-rated assemblies to other fire areas as there are no direct combustible pathways. No penetration openings exceed 4 feet x 4 feet in size. No penetration openings are located such as to provide a direct path for flame spread beyond the boundary walls. In specific cases when 4 feet x 4 feet horizontal openings exist, combustibles are located only on one side and are approximately 5 feet from the penetration opening. Detection is provided as a minimum on at least one side of the boundary for early warning of a fire. Hose streams and portable extinguishers are available for manual fire fighting. Door openings are protected by approved fire doors, frames, and hardware or special function doors, which have been evaluated to provide an equivalent level of fire protection. This evaluation has been reviewed and approved by a qualified Fire Protection Engineer. Refer to Section 4.1 of the STP FHAR, Comparison to Appendix R, Section III.N for fire door

surveillance methods. The penetrations for ventilation systems are protected by standard "fire door dampers," as indicated in the Fire Hazard Analysis Report.

Fire doors have been installed in conformance with the criteria of National Fire Protection Association (NFPA) 80 and Underwriters Laboratory (UL) with the following exceptions:

1) Door to frame gaps shall not exceed 1/4 inches. (NFPA 80 allowable is 1/8 inches)
2) Bottom of door to floor gap shall not exceed 1 inch. (NFPA 80 allowable is 3/4 inches)

The above exceptions have been fire tested and shown to be acceptable barriers.

A detailed analysis of the special function doors (i.e., tornado resistant, watertight, and missile proof) with respect to fire resistant doors was submitted to the NRC staff in letter ST-HL-AE-1511 (accession number 8511050150) dated October 31, 1985 on pages 76 through 108 and in letter ST-HL-AE-1626 (accession number 8603250113), dated March 19, 1986 (pgs 48-60A).

Details of additional special function doors (i.e., horizontal hatch doors) were presented to the NRC during the initial licensing Appendix R Audit.

Security modifications to STP fire doors have been accomplished such that the UL-Rating of the doors is not affected.

Enclosed stairwells and elevator shafts are constructed of 2-hour rated fire barrier with Class B fire doors and dampers. In order for fire to propagate through a stairwell, it must pass through two 2-hour rated fire barriers. Thus the stairwell itself is equivalent to a 3-hour fire barrier. In addition, the combustible loading in the stairwell is insignificant and cannot support a fire of sufficient intensity to compromise a 2-hour rated fire barrier.

Exterior walls are non-rated with the exception of portions where significant exposures are located within 50 feet of the wall. Non-rated walls with significant exposures located within 50 feet of the wall may be acceptable on a case-by-case basis when acceptability is supported by an evaluation in accordance with NRC Generic Letter 86-10. Surveillance inspections and testing is not required for non-rated portions of exterior walls.

Detailed analyses of additional special function doors (i.e., Halon Pressure Resistant Door Assemblies) for Fire Area 1, (Control Room/Relay Cabinet Room Fire Area Boundary) are provided in Tables 4.2-3 and 4.2-4 of the STP Fire Hazards Analysis Report. Although not UL labeled, these doors are constructed and installed similar to labeled 3-hour fire rated doors (Unit 2 only).

Deviation

Three foot by eight foot aisle separation is not provided between all tray stacks in the cable spreading room.

Justification

All parts of the room are accessible for manual fire suppression and can be reached by at least one effective hose stream. However, cable tray configurations in parts of the room form physical barriers which make manual fire suppression efforts somewhat more difficult. Therefore, in those specific areas, as well as throughout the entire cable spreading room, automatic wet pipe sprinkler protection is provided at the ceiling level to control a fire; the 3-hour fire barriers enclosing each cable spreading room will contain a fire.

Fire 27 (Reference 2)

Deviation

Penetration seals and/or dampers in Fire Area boundaries are unrated. Exterior walls and/or ceilings are non-rated.

Justification

Same as for Fire Area 31 described above.

Deviation

Pump houses and rooms housing safety related pumps are not protected by automatic sprinkler systems.

Justification

Safety-related pumps are not provided with automatic sprinkler protection since the Fire Hazards Analysis demonstrates that a postulated fire in these areas will not endanger other safety related equipment required for safe shutdown. These areas are provided with automatic fire detectors that alarm locally as well as provide remote annunciation in the control room. Portable extinguishers and manual hose stations are provided near each area. At least one effective hose stream will reach all parts of the pump house/pump rooms.

NRC Request for Information – RAI-05 Standards and Listings for Systems and Barriers

Section 3.0 of the requests states that fire protection features are installed in the fire areas containing the redundant equipment. However, the requests do not state whether the features have been designed and installed in accordance with recognized design standards.

Where fire protection features such as detection and suppression systems and fire rated assemblies are installed, describe the technical basis for such installations including the applicable codes, standards and listings used. In addition, provide a technical justification for any deviations from codes, standards and listings by independent testing laboratories in the fire areas that could impact this evaluation. Also, provide a technical justification for any non-rated fire protection assemblies. For example:

Fire Area (FA) 27 is noted as having ionization smoke detectors installed throughout the area. State whether the detectors have been installed and maintained in accordance with a particular design standard or basis, e.g. National Fire Protection Association 72: National Fire Alarm Code, 1985 Edition.

Section 3.1 of the March 3, 2009, request states that the fire barriers that enclose Fire Zone Z127 do not contain 3-hour rated doors. No description is provided for the water-tight door in Fire Zone Z109.

Fire Zone Z139 is noted as having an automatic wet pipe sprinkler system installed over areas of concentrated cabling. State whether the sprinklers have been installed and maintained in accordance with a particular design standard or basis, e.g. National Fire Protection Association 13: Standard for the Installation of Sprinkler Systems, 1985 Edition.

STPNOC Response:

STP has installed sprinkler systems to meet the requirements of NFPA 13-1976 and NFPA 231C-1975, Section 3.10-4. Deviations are listed in the FHAR Section 3.10-4. The deviations were approved by the NRC Safety Evaluation Report, NUREG-0781, Supplement No. 3, dated May 1987.

STP has installed detectors to meet the requirements of NFPA 72D, 1975. Deviations are listed in FHAR Section 3.10-4. The deviations were approved by the NRC Safety Evaluation Report, NUREG-0781, Supplement No. 3, dated May 1987.

STP performs periodic system/component testing based on NUREG-0452, Revision 5, Standard Technical Specifications for Westinghouse Pressurized Reactors. STP letter ST-HL-AE-2007 (accession number 8704070085), dated March 26, 1987 and Final Safety Analysis Report (FSAR) Section 9.5.1.6.1 provide details and clarification regarding the testing program.

In the March 3, 2009 submittal, the statement in Section 3.1 regarding a watertight door in Fire Zone Z109 was in error. This watertight door is in Fire Zone Z141, the Boric Acid Tank Rooms.

This door is a steel construction, swing-type door. This door is in a fire zone boundary and not a fire area boundary. There are minimal combustibles in Fire Zone Z141.

In addition, technical justification for deviations from Codes and Standards for Fire Area 31 and Fire Area 27 are discussed in the response to RAI-04.

NRC Request for Information – RAI-06 Time and Sequence Assumptions

The requests lack a detailed description of the series of events that may occur prior to initiating the Operator Manual Action procedures.

Describe the circumstances and assumptions needed to enter the OMA procedure. For example, describe the amount of time, and the technical basis, that has been assumed for detection and assessment of a postulated fire. Additionally, provide an analysis and a technical justification to evaluate scenarios where components fail, or damage occurs, before a fire has been detected.

STPNOC Response:

The circumstances and assumptions needed to enter the fire safe shutdown procedure are:

- A fire or explosion is verbally reported by a person at the scene or an alarm occurs on the Fire Protection Computer with confirmation of an actual fire.
- The fire is progressing so that it is likely to cause a loss of the ability to maintain any of the following safe shutdown functions:
  - Reactivity control function
  - Reactor coolant makeup function
  - Reactor heat removal function
  - Process monitoring function
  - Safe shutdown equipment support function

Attachment 2 provides the validated safe shutdown manual action timelines for Fire Areas 27 and 31.

Fire Area 31 (Reference 1)

Fire Area 31 contains the Train B cable spreading room on the 60 foot elevation level of the Electrical Auxiliary Building. A fire in this area can result in spurious actuations of any of the following components:

- A pressurizer power-operated relief valve (PORV) may open. Indication of this spurious actuation will be readily available in the control room so that operators will take action to de-energize the PORV.

- The suction valve to the charging pumps from the VCT outlet may spuriously close. Indication of this spurious actuation will be readily available in the control room so that the charging pumps can be stopped and the control switch put in PULL-TO-LOCK.
- A pressurizer pressure channel may fail. The control room can readily transfer to a reliable channel.
- Containment emergency sump isolation valves may spuriously fail open and drain the suction source for the charging pumps. Indications are available in the control room for operators to take action and manually close the failed open valve(s) to ensure adequate inventory is maintained.
- Steam generator power-operated relief valve(s) may spuriously open. Indications are available in the control room for operators to take action and manually close the failed open valve(s).
- The auxiliary spray valve may spuriously open. Indications are available in the control room for operators to de-energize the valve and fail it closed.
- The pressurizer spray valve may spuriously open. Operators will take action to trip the reactor and trip the reactor coolant pumps that provide the pressure head for spray.
- A spurious Engineered Safety Features (ESF) actuation may occur. Operators will block or reset the spurious ESF actuation signal and realign safe shutdown components to their desired shutdown position.
- A containment spray pump may spuriously start. Indications are available in the control room for operators to take action and secure the pump.

Fire Area 27 (Reference 2)

Fire Area 27 is divided into seven fire zones. A description of the fire area is provided in Section 3.1 of Reference 2. A fire in this area can result in the spurious actuation of the following component:

- The suction valve to the charging pumps from the VCT outlet may spuriously close. Indication of this spurious actuation will be readily available in the control room so that the charging pumps can be stopped and the control switch put in PULL-TO-LOCK.

- Seal water injection valve (CV-HCV-0218) may spuriously close. Indication of this spurious actuation will be readily available in the control room so that the charging pumps can be stopped and the control switch put in PULL-TO-LOCK.

- The charging pump motor-operated discharge valve (CV-MOV-8377B) may spuriously close. Indication of this spurious actuation will be readily available in the control room so that the charging pumps can be stopped and the control switch put in PULL-TO-LOCK.

Justification

It is feasible that a fire could initiate and result in one or more of the above spurious actuations before the detection of a fire. The STP licensing basis fire hazards analysis only assumes that the worst-case single spurious actuation will occur. Indications of the spurious actuation are readily available in the control room so that the operator would respond per plant procedures. The operator actions to mitigate the spurious actuations have been previously reviewed and approved by the NRC during initial licensing (NUREG-0781, Supplement 2, "Safety Evaluation Report related to the operation of the South Texas Project, Units 1 and 2, Docket Nos. 50-498 and 50-499, dated January 1987). These spurious actuations would not adversely impact the ability to perform the OMAs discussed in References 1 and 2 because they do not prevent the completion of the proposed OMAs. The OMAs are not required to be performed until two hours after the initiation of the fire. Analysis has demonstrated that the OMAs are feasible and reliable so that the valves are in the required position with sufficient time-margin to compensate for uncertainties to achieve safe shutdown.

NRC Request for Information – RAI-07 Operator Qualification

The requests make reference to the "licensed operator re-qualification program". Provide a description of the portion of the program that would qualify operators with regard to the diagnosis of fires and their potential threat to components.

STPNOC Response:

Licensed operators receive classroom and on-the-job training regarding operation of the Fire Protection system during initial Licensed Operator Training (LOT). This includes training to ensure appropriate and accurate diagnosis of location of fires. Additionally, licensed operators are trained during LOT on plant risk assessment regarding the specifics and basis behind loss of function of equipment and components important to reactor safety.

Licensed operators then receive continuing training on any major changes to the Fire Protection system, such as modifications to the detection system or software in the Licensed Operator Requalification (LOR) program. LOR training also includes training on an as-needed basis on risk assessment. This training includes the basis of how component and equipment failures affect the risk to reactor safety.

NRC Request for Information RAI-08 – Fire Area of Origin Re-entry

Section 3.3 of the March 3, 2009, request states that operators are required to re-enter FA 27 to perform an action following a fire event. Analyses often assume loss of all equipment in the fire area of origin. In fact, this assumption is made at STP according to Criterion 2 of Sections 3.2 and 3.3 of the same request.

Justify why the assumption that all equipment located in the fire area of origin is lost during a fire does not apply to all postulated fire events in FA 27. Additionally, provide critical details and/or assumptions of the analysis that demonstrates that the required safe shutdown equipment and/or component located within the area is maintained free of fire damage and remains operable following the fire event.

STPNOC Response:

The fire safe shutdown analysis credits the capability of manually re-opening, if required, the motor-operated discharge valve for the Train B charging pump. The valve is located in the fire area in Fire Zone Z127. Although unlikely, the analysis assumes that the control cable to the motor-operated discharge valve may sustain a fire-induced circuit failure such that the valve would shut. The analysis assumes that the mechanical portions of the valve remain undamaged by fire. Fire Zone Z127 has essentially no ignition sources and very few combustibles such that the fire loading has a fire severity of 0.33 minutes.

Major combustibles in Fire Area 27 are in cable trays located at the ceiling level and have a sprinkler system installed for added protection. There are no combustibles in the immediate ingress/egress pathway. Fire Zone Z127 boundaries are heavy concrete which provide significant obstruction that will inhibit zone-to-zone fire propagation. For these reasons, the motor-operated discharge valve will remain free of fire damage so that the capability to manually open the valve, if required, is maintained.

NRC Request for Information RAI-09 – Smoke Evacuation Procedures and Tenability

Criterion 3 in Section 3.3 of the March 3, 2009, request states that the manual actions in FA 27 will require the use of personnel protection equipment and may require the use of self-contained breathing apparatus (SCBA). Additionally, Criterion 3 of Section 3.3 of the March 3, 2009, request states that smoke is removed from the fire area and directed up stairwells in a manner that should not impede the path for performing the manual action.

Provide critical details and/or assumptions of the analysis that demonstrates that the path that operators are expected to traverse, as well as the space where control valve CV-MOV-8377B is located, remain tenable for operators to enter the fire zone following a fire event and fire brigade operations including scenarios requiring the use of SCBA.

State whether operator use of SCBA is required to complete the OMAs. If so, demonstrate that operators tasked with performing the manual actions arrive at the fire zone donned in SCBA to perform the actions.

Describe the basis for the practice of removing smoke by directing it into stairwells and substantiate the claim that this practice would not adversely impact the performance of the operator manual actions.

STPNOC Response:

The following discussion provides the critical details and assumptions of the analysis that demonstrates that the path that operators are expected to traverse, as well as the space where control valve CV-MOV-8377B is located, will be accessible.

Attachment 1 to this enclosure provides a lay-out drawing of Fire Area 27 and the fire zones within this area including the access pathway to valve CV-MOV-8377B. Attachment 5 to the Enclosure in Reference 2 provides a zone-by-zone analysis that demonstrates that the path that operators are expected to traverse, as well as the space where valve CV-MOV-8377B is located, remain tenable for operators to enter the fire zone following a fire event and fire brigade operations. The key conclusions of this analysis are repeated below:

Fire Zone Z108

There are few ignition sources in this fire zone that could cause a fire, and the consequences of each postulated fire scenario are minor. The combustible inventories in the zone would only support a small fire (approximately 7 minute duration based on combustible loading). The Fire Zone Z108 boundaries are heavy concrete and contain 3-hour rated fire doors which provide significant obstructions that will inhibit zone-to-zone fire propagation substantially reducing the probability of a fire spreading throughout the entire fire area.

Operator re-entry into Fire Area 27 to confirm that valve CV-MOV-8377B is open (or to re-open, if necessary) does not include transit through Fire Zone Z108. A fire in Z108 is not expected to affect other fire zones outside of its borders.

Fire Zone Z109

There are few ignition sources in this fire zone that could cause a fire, and the consequences of each postulated fire scenario are minor. The combustible inventories in the zone would only support a small fire (approximately 24 minute duration based on combustible loading). The Fire Zone Z109 boundaries are heavy concrete and contain 3-hour rated fire doors which provide significant obstructions that will inhibit zone-to-zone fire propagation substantially reducing the probability of a fire spreading throughout the entire fire area.

Operator re-entry into Fire Area 27 to confirm that valve CV-MOV-8377B is open (or to re-open, if necessary) does not include transit through Fire Zone Z109. A fire in Z109 is not expected to affect other fire zones outside of its borders.

Fire Zone Z127

There are few ignition sources in this fire zone that could cause a fire, and the consequences of each postulated fire scenario are minor. The combustible inventories in the zone would only support a small fire (approximately 1 minute duration based on combustible loading). The Fire Zone Z127 boundaries are heavy concrete that will inhibit zone-to-zone fire

propagation substantially reducing the probability of a fire spreading throughout the entire fire area.

Operator re-entry into Fire Area 27 to confirm that valve CV-MOV-8377B is open (or to re-open, if necessary) does include transit through Fire Zone Z127. Based on the low quantities of combustibles (maximum permissible loading of 30 minutes) that should be readily extinguished, a fire originating in Fire Zone Z127 will not impact re-entry into Fire Area 27 to operate CV-MOV-8377B. Operator re-entry is not proposed until one hour after origination of the fire event. However, the worst case combustible loading will not support a fire for longer than 30 minutes.

Fire Zone Z138

There are few ignition sources in this fire zone that could cause a fire, and the consequences of each postulated fire scenario are minor. The combustible inventories in the zone would only support a small fire (approximately 17 minutes duration based on combustible loading). The Fire Zone Z138 boundaries are heavy concrete that will inhibit zone-to-zone fire propagation substantially reducing the probability of a fire spreading throughout the entire fire area.

Operator re-entry into Fire Area 27 to confirm that valve CV-MOV-8377B is open (or to re-open, if necessary) does include transit through Fire Zone Z138. The combustibles are not concentrated along the transit route. Based on the low quantities of combustibles (maximum permissible loading of 60 minutes) that should be readily extinguished, a fire originating in Fire Zone Z138 will not impact re-entry into Fire Area 27 to operate CV-MOV-8377B. Operator re-entry is not proposed until one hour after origination of the fire event. However, the worst case combustible loading will not support a fire for longer than 60 minutes.

Fire Zone Z139

There are few ignition sources in this fire zone that could cause a fire, and the consequences of each postulated fire scenario are minor since the combustible inventories in the zone would only support a small fire (approximately 8 minutes duration based on combustible loading). The Fire Zone Z139 boundaries are heavy concrete and contain 3-hour rated fire doors that will inhibit zone-to-zone fire propagation substantially reducing the probability of a fire spreading throughout the entire fire area.

Operator re-entry into Fire Area 27 to confirm that valve CV-MOV-8377B is open (or to re-open, if necessary) does include transit through Fire Zone Z139. The combustibles are not concentrated along the transit route. Based on the low quantities of combustibles (maximum permissible loading of 30 minutes) that should be readily extinguished, a fire originating in Fire Zone Z139 will not impact re-entry into Fire Area 27 to operate CV-MOV-8377B. Operator re-entry is not proposed until one hour after origination of the fire event. However, the worst case combustible loading will not support a fire for longer than 30 minutes.

Fire Zone Z141

There are few ignition sources in this fire zone that could cause a fire, and the consequences of each postulated fire scenario are minor. There are no combustible inventories in the zone. The Fire Zone Z141 boundaries are heavy concrete and contain a water tight special function door that will inhibit zone-to-zone fire propagation substantially reducing the probability of a fire spreading throughout the entire fire area.

Operator re-entry into Fire Area 27 to confirm that valve CV-MOV-8377B is open (or to re-open, if necessary) does not include transit through Fire Zone Z141.

Fire Zone Z142

There are few ignition sources in this fire zone that could cause a fire and the consequences of each postulated fire scenario is minor since the combustible inventories in the zone would only support a small fire (approximately 3 minutes duration based on combustible loading). The Fire Zone Z142 boundaries are heavy concrete and contain 3-hour rated fire doors that will inhibit zone-to-zone fire propagation substantially reducing the probability of a fire spreading throughout the entire fire area.

Operator re-entry into Fire Area 27 to confirm that valve CV-MOV-8377B is open (or to re-open, if necessary) does not include transit through Fire Zone Z142.

The use of SCBAs may be required to complete the OMA for verifying that CV-MOV-8377B is open dependent on the consequences of the fire. Attachment 2 demonstrates that the safe shutdown watch has greater than 30 minutes to assess whether an SCBA will be required to re-enter the fire area. This is sufficient time to don a SCBA and arrive at the fire area for performing the OMA.

For smoke and heat removal in Fire Area 27, a series of portable exhaust fans and flexible duct are used to exhaust smoke and heat from the area via stairwell #2 (see Attachment 1). The portable exhaust fan is used to exhaust the smoke and heat to the atmosphere via the door at the top of the stairwell per Fire Pre-plans for Fire Area 27. This stairwell #2 is an alternate pathway to access/egress Fire Area 27. Stairwell #4 (see Attachment 1) is the primary pathway to access the area in the event of a fire. The arrangement to exhaust should have no impact on the primary access/egress pathway to support the operator manual action to re-enter Fire Zone 27.

NRC Request for Information RAI-10 – Fire Severity, Duration and Proximity to Redundant Equipment

The March 3, 2009, request makes various references to the fire severity that is anticipated for Fire Zone Z127 ranging from 0.33 minutes (Section 3.3) to 30 minutes (Table 7-1) and Criterion 1 of Section 3.3 of the March 3, 2009, request states that the limiting zone fire duration is analyzed to be less than 25 minutes. Table 7-1 indicates that all but one of the

fire zones in FA 27 have a permissible fire loading but the associated analysis does not describe the location or distribution of the loading.

Address this contradiction and provide the correct fire loading values and assumptions and confirm which value was used for the fire severity analysis in FA 27.

Describe where the combustible fuel loading occurs within the fire zones, e.g. in close proximity to the redundant equipment, and describe what controls are in place to limit the storage of transient materials in the fire zone.

STPNOC Response:

For Fire Zone Z127, the 0.33 minute (Section 3.3) fire severity is based on the "typical" combustible loading. The 30 minute (Table 7-1) fire severity is based on the "maximum permissible" combustible loading. The typical combustible loading approximates the permanent combustible loading whereas the maximum permissible combustible loading allows for transient combustibles to support plant work. The limiting zone fire duration analyzed to be less than 25 minutes (Criterion 1 of Section 3.3) is for Fire Zone Z109 based on "typical" combustible loading. The OMA to re-enter the fire area and verify open or re-open charging pump discharge valve CV-MOV-8377B is not assumed to occur until 60 minutes after the fire starts. For this reason, the maximum permissible combustible loading was reduced for each fire zone in Fire Area 27 to ensure that the fire duration for any zone should not exceed 60 minutes. As a result, the maximum permissible combustible loading for Fire Zone Z109 was reduced from 144 minutes duration, as reported in Table 7-1, to 60 minutes duration.

The redundant components are located in Fire Zone Z127. There are limited combustibles primarily composed of an electrical panel, plastic and wire insulation in devices such as instrumentation, exit signs, detectors, lubricating oil, grease and limited transient combustibles. The fire loading has a fire severity of 0.33 minutes. All cables are located within steel conduits routed in the area for the redundant and associated equipment. The STP Fire Prevention Program does not allow any transient combustibles in the area without a Fire Watch in the area except for a single protective clothing (PC) bin. The bin is limited to an area that has no conduits above the bin. Each redundant component is located in an individual small concrete room. It is not plausible that a fire in one component could spread to any other component.

The storage of transient materials in the fire zone is controlled by plant procedure. Foremen and Supervisors are responsible for reviewing planned work involving ordinary combustibles. They determine the need for a Transient Fire Load Permit when such materials must be taken into safety-related structures. The need for a Permit is determined by the amount of material being taken into the area and compared with limits in the plant procedure. The limits in the plant procedure are less than the maximum permissible combustible loading for the area. Transient Fire Load Permits are approved by the Fire Protection Coordinator or designee. Frequent inspections are made of the plant to monitor for transient combustibles.

NRC Request for Information RAI-11 – Initiation of Procedures and Communications

Criterion 6 of Section 3.3 states that valve CV-MOV-8377B is located in a communications dead zone. Additionally, the performance times noted in Criterion 2 of Section 3.2 of the March 3, 2009, request and Criterion 2 of Section 3.0 of the February 3, 2009, request assume that operators initiate the OMA procedure from their normal watch station.

Describe how a delay to initiate the OMA procedures as a result of communication challenges, absent/preoccupied operators or otherwise, has been accounted for in the assumed timelines.

Describe to what extent operators tasked with completing the manual action would need to communicate with the control room and specifically how this would be accomplished.

State whether other communication dead zones exist and, if so, describe how instances where operators may be stationed in such locations or touring the plant at the time the OMA procedure is initiated is accounted for in the analysis. Also describe how the potential time required for the operators to return to their duty station has been accounted for in the analysis.

STPNOC Response:

There are no dead zones for the plant fire alarm. Therefore, the operator would be alerted to a fire event.

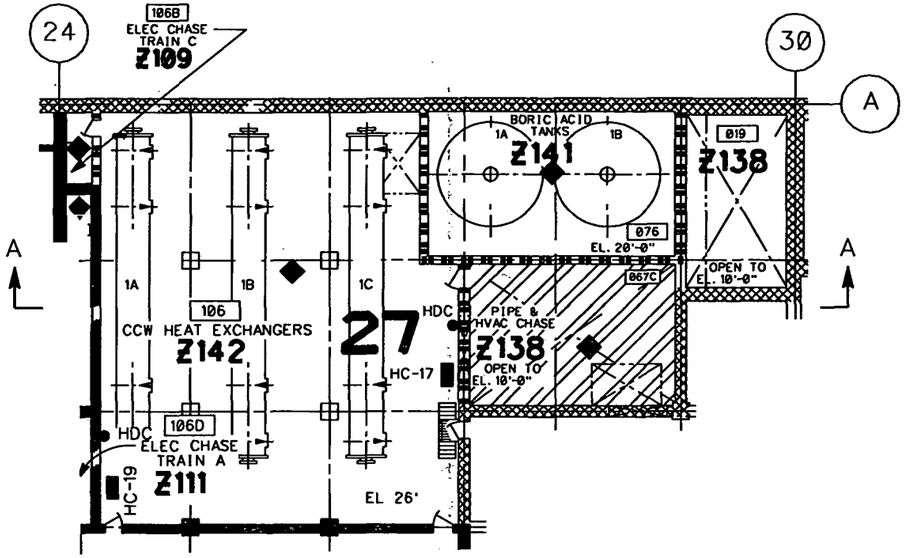
The operator is aware of the communications dead zone associated with valve CV-MOV-8377B. The time line to perform the action to re-enter Fire Area 27 and verify open or re-open CV-MOV-8377B and exit the Fire Area to communicate the completion of the action is 14 minutes. This action starts 60 minutes after the fire initiation and after the fire is out. The 14 minutes to perform the OMA is in addition to the time margin of 46 minutes for the OMA to be complete to meet the time of two hours used in the thermal-hydraulic analysis.

The time margin of 46 minutes to perform the OMA is sufficient to account for communication challenges, absent/preoccupied operators or the potential time required for the operators to return to their duty station.

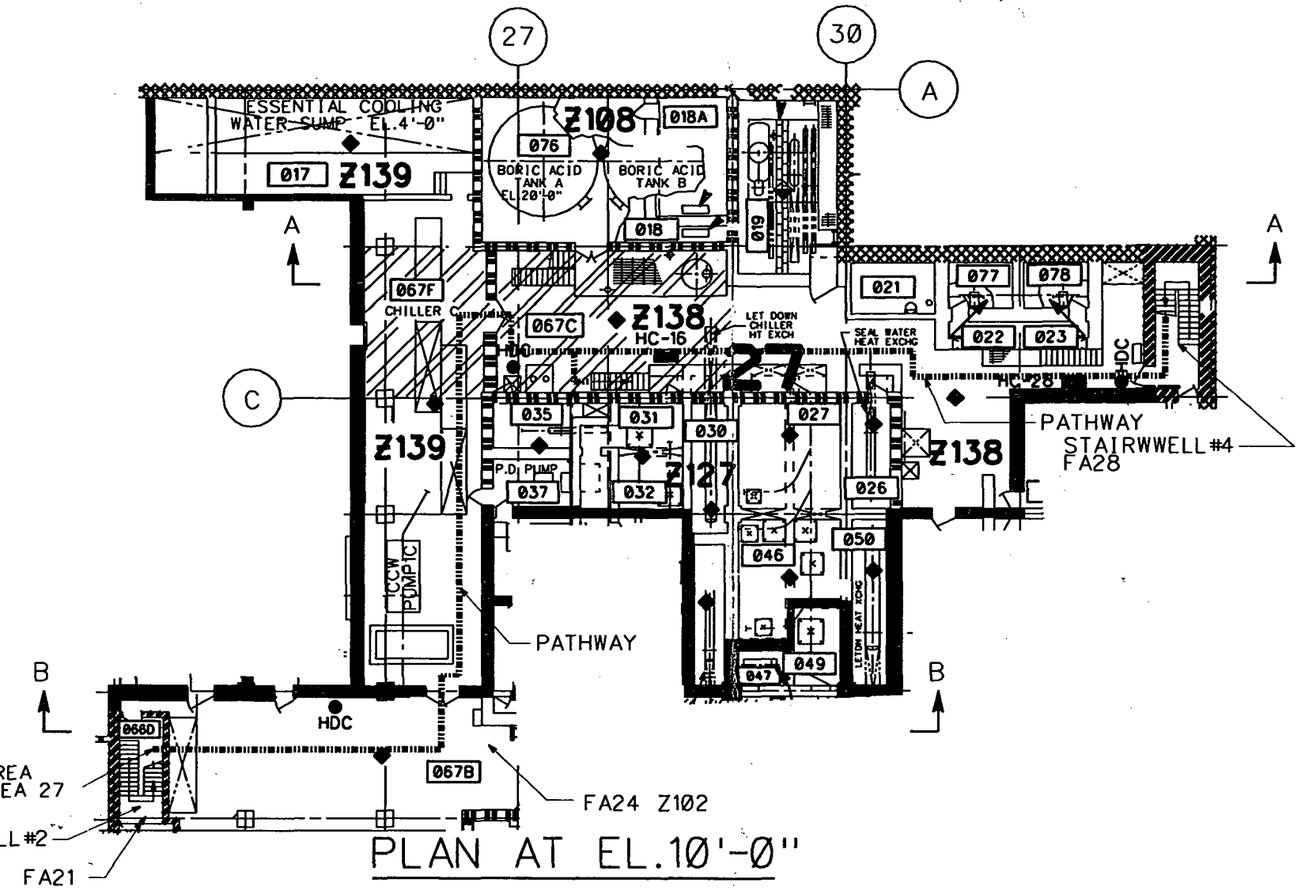
Attachment 1

Lay-out Drawing of Fire Area 27

(Two pages)



PLAN AT EL.26'-Ø"

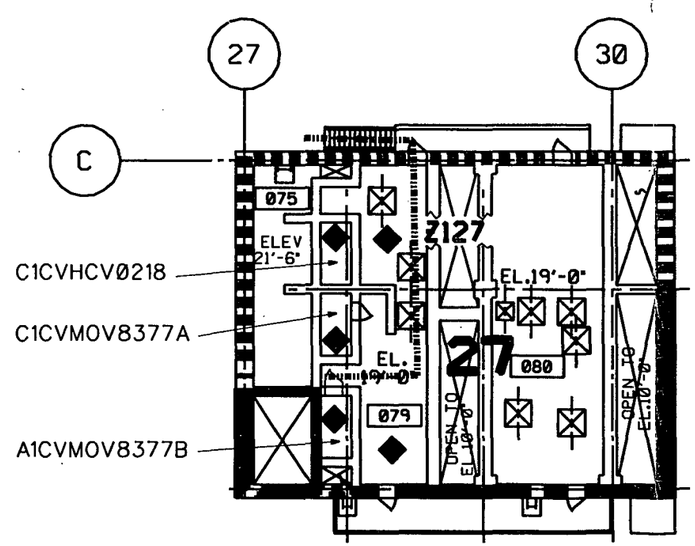


PLAN AT EL.10'-Ø"

FIRE AREA 27

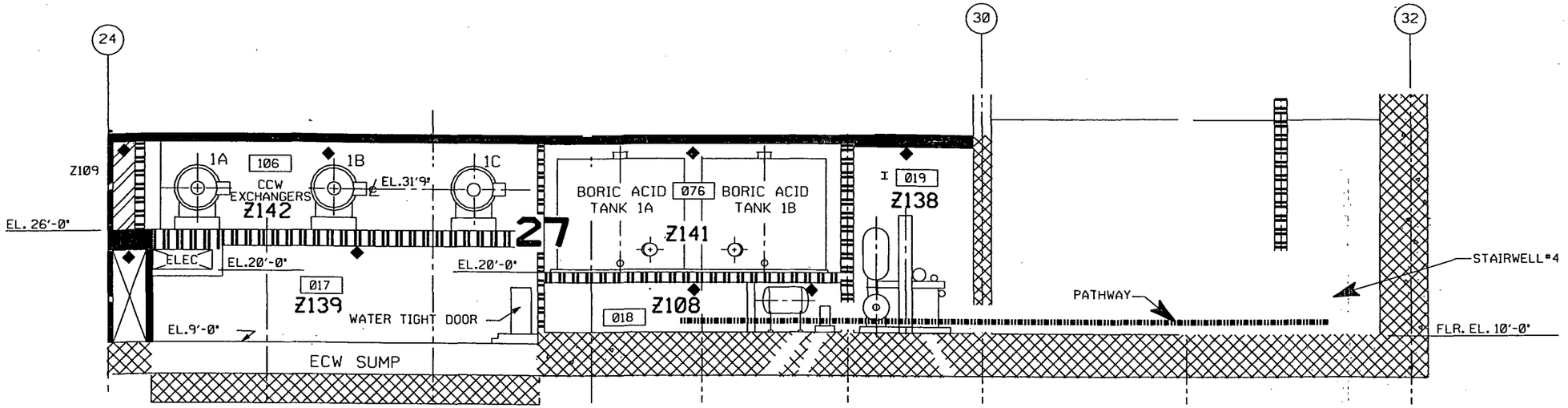
REF. DWGS.

7M149M24513#1
7M149M24514#1
7M149M24519#1

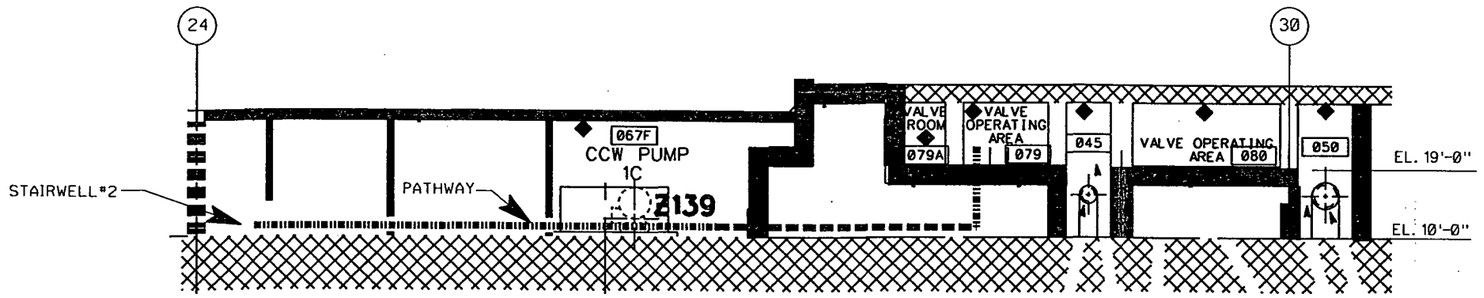


PLAN AT EL.19'-Ø"

FA0016.104



SECTION A-A



SECTION B-B

REF. DWGS.
7M149M24521#1
7M149M24523#1

FIRE AREA 27: SECTIONAL VIEWS

BSEED.DGN

FA0098.062

Attachment 2

Safe Shutdown Manual Action Timelines

for Fire Areas 27 and 31.

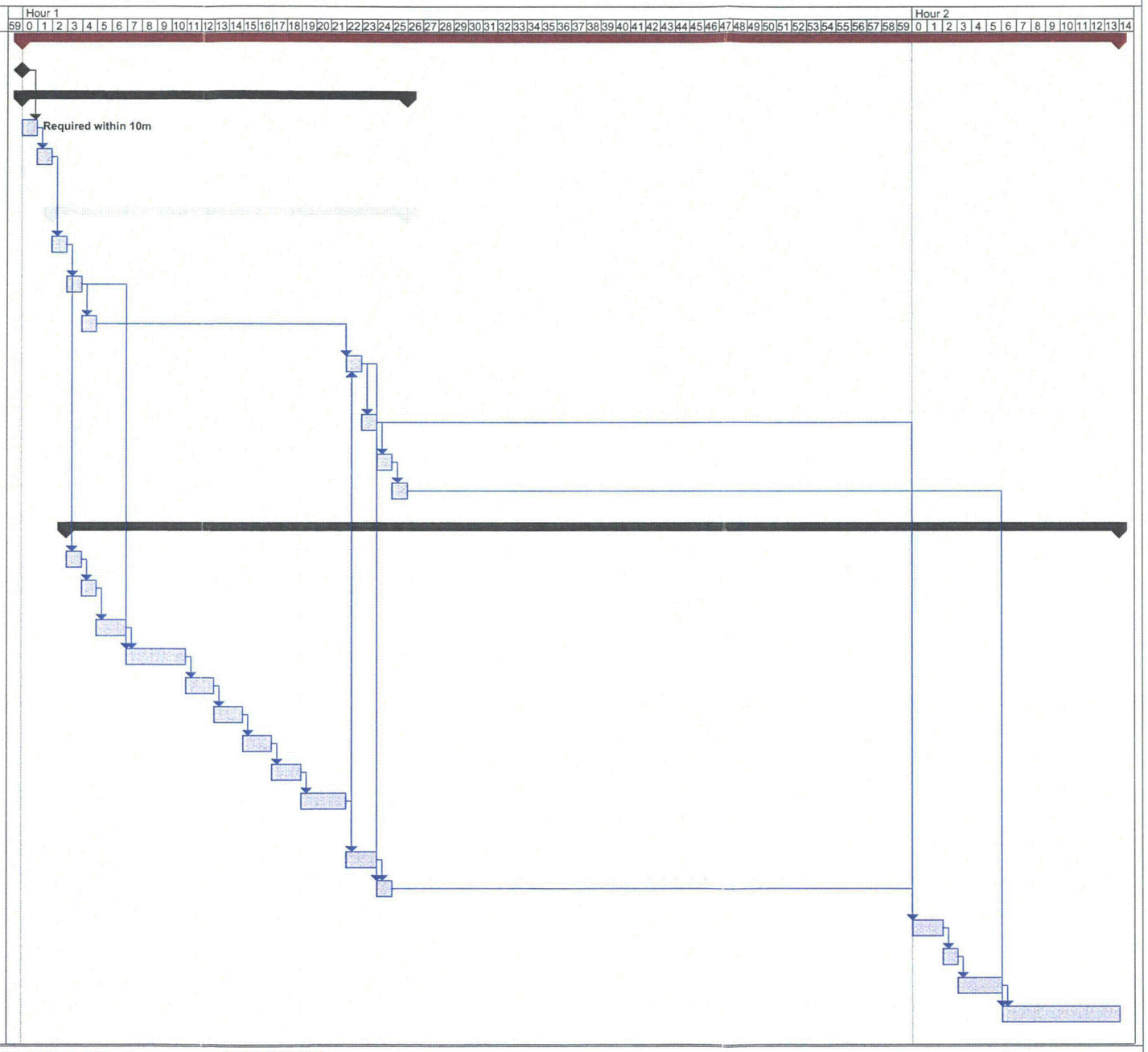
Two pages

- STP SAFE SHUTDOWN MANUAL ACTION TIMELINE FOR FIRE IN FA-27 (Charging via MOV-112C)
- STP SAFE SHUTDOWN MANUAL ACTION TIMELINE FOR FIRE IN FA-31

  Note: The graph provides the sequence that the actions are performed. The table provides the duration for performing each action to the nearest minute.

STP
SAFE SHUTDOWN MANUAL ACTION TIMELINE FOR FIRE IN FA-27
(Charging via MOV-0112C)

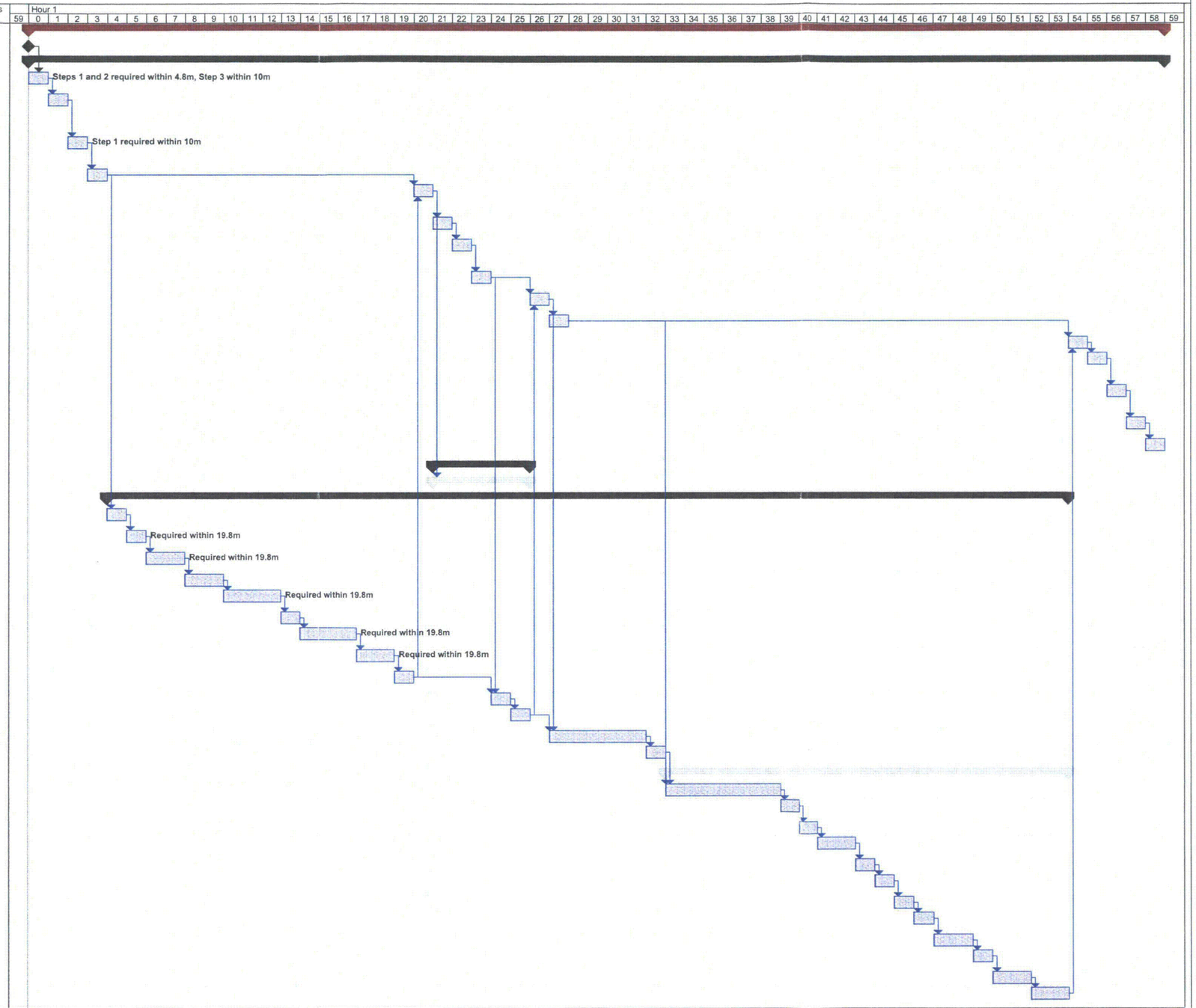
ID	Step	Task Name	Duration	Predecessors (ID)
1		**HOT SHUTDOWN ACTIONS FOR FIRE IN FA-27**	**74 mins**	
2		Fire detected and determined to require hot shutdown manual actions	0 mins	
3		**Primary Reactor Operator**	**26 mins**	
4	2.0	PLACE Both Centrifugal Charging Pumps In PULL TO LOCK	1 min	2
5	3.0.a	(1) Ensure LETDN ORIF HDR ISOL FV-0011 is CLOSED (if response not obtained CLOSE LETDN ISOL VLVS, (2) Ensure Low Pressure Letdown are CLOSED (if not CLOSE LETDN CNTMT ISOL VLVS)	1 min	4
6	4.0	Establish Seal Injection	24 mins	
7	4.0.a, b, c	Direct operator to DEENERGIZE: (1) MOV-0112C, (2) MOV-0112B, (3) HCV-0218, (4) MOV-8377B	1 min	5
8		Direct operator to: (1) OPEN CV-MOV-0112C, (2) CLOSE CV-MOV-0112B	1 min	7
9	4.0.d	Direct operator to CLOSE individual RCP seal water injection throttle valves	1 min	8
10	4.0.e, f	(1) CHECK RCP Number 1 Seal Water Inlet Temperatures, (2) OPEN FCV-0202 (if response not obtained direct EAB Operator to deenergize & open locally)	1 min	23,9
11	4.0.g, h	(1) CLOSE MOV-0025, (2) Direct operator to deenergize and ENSURE OPEN MOV-8377B	1 min	10
12	4.0.i	START CCP 1B(2B)	1 min	11
13	4.0.j	Direct EAB Operator to slowly open individual RCP seal water injection valves to establish 6 to 13gpm seal injection flow rate	1 min	12
14		**EAB Operator**	**71 mins**	
15	4.0.a, b, c	Transit from EAB station (Room 209) to EAB 60', SWGR Room 318	1 min	7
16	4.0.a, b, c	OPEN: (1) MCC E1C2(E2C2)/E1 for MOV-0112C, (2) MCC E1C1(E2C1)/G3 for MOV-0112B, (3) ERR123C DS-29 for HCV-0218	1 min	15
17		Transit to EAB 10' Room 010 and OPEN MCC E1A4(E2A4)/J1	2 mins	16
18		Transit to MAB 10' Room 044	4 mins	8,17
19		OPEN CV-MOV-0112C	2 mins	18
20		Transit to MAB 41' Room 226	2 mins	19
21		CLOSE CV-MOV-0112B	2 mins	20
22	4.0.d	Transit to MAB 29' Room 108D	2 mins	21
23	4.0.d	WHEN directed from Control Room, CLOSE individual RCP seal water injection throttle valves [1(2)-CV-0032A, 1(2)-CV-0032B, 1(2)-CV-0032C, 1(2)-CV-0032D]	3 mins	22
24	4.0.f	Transit to MAB 10' Room 067B (South of MCCs)	2 mins	23
25	4.0.f	WHEN directed from Control Room, OPEN ERR107, DS-22, CENTRIFUGAL CHARGING PUMP 1B(2B) RECIRC FCV-0202	1 min	24,10
26		Transit to MAB 19' Room 079	2 mins	25,11
27		OPEN CV-MOV-8377B	1 min	26
28	4.0.j	Transit to MAB 29' Room 108D	3 mins	27
29	4.0.j	WHEN directed from Control Room, SLOWLY OPEN seal water injection throttle valves [1(2)-CV-0032A, 1(2)-CV-0032B, 1(2)-CV-0032C, 1(2)-CV-0032D]	8 mins	28,13



Time "0" ◆ Operator Summary ▬ Action Summary ▬ Task ▭

STP
SAFE SHUTDOWN MANUAL ACTION TIMELINE FOR FIRE IN FA-31

	Step	Task Name	Duration	Predecessors (ID)
1		**HOT SHUTDOWN ACTIONS FOR FIRE IN FA-31**	**59 mins**	
2		Fire detected and determined to require hot shutdown manual actions.	0 mins	
3		**Primary Reactor Operator**	**59 mins**	
4	2.0, 3.0, 4.0	(1) De-energize PCV-0656A, (2) ATTEMPT To Close Pressurizer PORV Block Valve, (3) PLACE Both Charging Pumps In PULL TO LOCK	1 min	2
5	5.0	(1) Ensure LETND ORIF HDR ISOL FV-0011 is CLOSED (if response not obtained CLOSE LETDN ISOL LCV-0465 and LCV-0468), (2) Low Pressure Letdown (both trains) are CLOSED (if response not obtained CLOSE MOV-0024, MOV-0023)	1 min	4
6	6.0, 7.0, 8.0	(1) Transfer control/indication PT-0457 to PT-0455, (2) ENSURE following are CLOSED (i) CNTMT SUMP 1B(2B) TO SI SUCT HDR 1(2)-SI-MOV-0016B, (ii) CNTMT SUMP 1C(2C) TO SI SUCT HDR 1(2)-SI-MOV-0016C	1 min	5
7	9.0	Direct field operator to locally open breakers	1 min	6
8	10.0.a, b, c	Monitor Pressurizer pressure. If Pressurizer pressure contol is lost, (1) Trip Reactor, (2) Trip RCP 1A(2A) & RCP 1D(2D), (3) If Pressurizer pressure does NOT stabilize,THEN TRIP all but one RCP, RCP 1B(2B) or RCP 1C(2C)	1 min	7,35
9	11.0	RESET (BLOCK) SI and RESTORE affected components for the available Safe Shutdown Trains to their required Safe Shutdown positions	1 min	8
10	12.0	Check CCW Pump 1A Supplying RCP Seal Cooling (if response not obtained (i) Start ECW Pump 1A(2A), (ii) Start CCW Pump 1A(2A), (iii) Verify CCW Flow to RCPs)	1 min	9
11	13.0	Ensure CS Pump 1B(2B) is secured (if response not obtained, direct field operator to remove CS pump breaker closing fuses)	1 min	10
12	15.0.a	Monitor RWST Level via SI-LI-0931 and SI-LI-0932 (if indication not available in Control Room, direct operator to check locally)	1 min	11,37
13	15.0.b.1, 2, 3	Check RWST level (if RWST level spuriously drained then direct field operator to establish gravity feed from the BATs)	1 min	12
14	15.0.b.4	Monitor BAT Level	1 min	13,52
15	16.0.d, e	(1) Direct operator to establish charging locally, (2) CLOSE RCP seal water injection, (3) START centrifugal charging pump(s) AS NECESSARY to maintain Pressurizer Level	1 min	14
16	16.0.f	CHECK RCP Number 1 Seal Water Inlet Temperatures On Plant Computer Display RC 010 - WITHIN 30 deg F OF Seal Water Injection Temperature "TEMP TI-0216" and ENSURE RCP Seal Leakoff Isolation Valves OPEN	1 min	15
17	16.0.g, h	Ensure RCP Seal Leakoff Isolation Valves Open for FV-3154, FV-3155, FV-3156 and FV-3157 and RCP Seal Injection Flow Indication is available	1 min	16
18	16.0.i	SLOWLY OPEN RCP Seal Water Injection "FLOW CONT HCV-0218" To Restore Seal Flow To Between 6 And 13 GPM To Affected RCP(s)	1 min	17
19		**Secondary Reactor Operator**	**5 mins**	
20	10.d	Perform Addendum 80, Reactor Trip Response	5 mins	8
26		**EAB Operator**	**50 mins**	
27	9.0.a	Transit to EAB 35' Room 212 from EAB Operator station and WHEN directed from Control Room, OPEN MCC E1B2(E2B2)/M1	1 min	7
28	9.0.b	Transit to EAB 35' Room 213 and OPEN - 125 VDC PL39B, Breaker 8 for PV-7421C, SG 1B(2B) PORV	1 min	27
29	9.0.b	Transit to EAB 60' Room 319 and OPEN - 125 VDC PL39C, Breaker 8 for PV-7431C, SG 1C(2C) PORV	2 mins	28
30	9.0.b	If unable to denergize SG 1B(2B) PORV, Transit Train B, IVC 58' Room 502	2 mins	29
31	9.0.b	Manually Close 1(2)-MS-0038 S/G 1B(2B) MAIN STEAM OUTLET PORV ISOLATION VALVE	3 mins	30
32	9.0.b	If unable to denergize SG 1C(2C) PORV, Transit Train C, IVC 58" Room 501	1 min	31
33	9.0.b	Manually Close S/G 1C PORV Close 1(2)-MS-0055 S/G 1C(2C) MAIN STEAM OUTLET PORV ISOLATION VALVE	3 mins	32
34	9.0.c	Transit to EAB 60' Rm 301 and OPEN - ERR114 DS 21, - AUX SPRAY VALVE 1(2)-CV-LV-3119	2 mins	33
35	9.0.d	Transit to EAB 60' Rm 318 and Open - MCC E1C2(E2C2)/L2 CNTMT SUMP 1C(2C) TO SI SUCT HDR 1(2)-SI-MOV-0016C	1 min	34
36	13.0.a	Transit to EAB 35' B TRN SWGR RM (Room 212)	1 min	35,11
37	13.0.a	(1) Remove Breaker Closing Fuse Block for CS Pump 1B(2B) in E1B(E2B)/10, (2) OPEN 4.16KV Bus E1B(E2B)/10	1 min	36
38	15.0.a	Transit to FHB	5 mins	37,12
39	15.0.a	Check RWST level: SI-LI-0931, SI-LI-0932 (local press. gauge on suction of NON-RUNNING LHSI pump aligned to RWST)	1 min	38
40		Establish gravity feed from the BATs	21 mins	
41	15.0.b.1	Transit to MAB 19' Rm 079	6 mins	13,39
42	15.0.b.1	WHEN directed from Control Room, UNLOCK and OPEN 1(2)-CV-0226, BORIC ACID TANK TO CHARGING PUMP SUCTION BORATION VALVE	1 min	41
43	15.0.b.1	Transit to MAB 20' Rm 076 BA Tank Rm.	1 min	42
44	15.0.b.1	OPEN 1(2)-CV-0333, BA TANK 1A(2A) TO SUCTION OF CHARGING PUMPS ISOL	2 mins	43
45	15.0.b.1	Transit to MAB 10' Rm 018A	1 min	44
46	15.0.b.1	OPEN 1(2)-CV-0335A, BA BATCHING TANK 1A(2A) TO BA TRANSFER PUMP 1A(2A) ISOL	1 min	45
47	15.0.b.1	Transit to MAB 10' Rm 018	1 min	46
48	15.0.b.1	OPEN 1(2)-CV-0335B BA BATCHING TANK 1A(2A) TO BA TRANSFER PUMP 1B(2B) ISOL	1 min	47
49	15.0.b.2	Transit to EAB 60' Rm 318	2 mins	48
50	15.0.b.2	WHEN directed from Control Room, OPEN MCC E1C1(E2C1)/G3 - VCT OUTLET ISOL 1(2)-CV-MOV-0112B	1 min	49
51	15.0.b.3	Transit to MAB 41' Rm 226 VCT Vlv Rm	2 mins	50
52	15.0.b.3	WHEN directed from Control Room, manually Close Valve - VCT OUTLET ISOL 1(2)-CV-MOV-0112B	2 mins	51



Time "0" ◆ Operator Summary ▬ Task Summary ▬ Task ▭