April XX, 2002

Tennessee Valley Authority
ATTN: Mr. J. A. Scalice
-- Chief Nuclear Officer and
Executive Vice President
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: SEQUOYAH NUCLEAR PLANT - NRC INSPECTION REPORT 50-327/02-03, 50-328/02-03

Dear Mr. Scalice:

On March 29, 2002, the Nuclear Regulatory Commission (NRC) completed a triennial fire protection inspection at the Sequoyah Nuclear Plant. The enclosed report documents the results of this inspection which were discussed on March 28-29, with Mr. Dennis Cole and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, the inspectors identified ~~a finding and~~ two issues of very low safety significance (Green). These ~~two~~ issues were determined to involve violations of NRC requirements. However, because of their very low safety significance and because they have been entered into your corrective action program, the NRC is treating these issues as Non-cited violations, in accordance with Section VI.A.1 of the NRC's Enforcement Policy. The first violation involved a failure to ensure that one of the redundant trains for isolation of normal letdown is maintained free of fire damage. The second violation involved the failure to properly establish the plant fire procedure such that actions necessary to mitigate the consequences of a severe fire could be ~~taken. { The finding involved the failure to provide adequate relay coordination to prevent a fault on one unit resulting in the inadvertent trip of the other unit.}~~ effectively performed.

If you deny these ~~n~~Non-cited violations, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Sequoyah Nuclear Plant.

NN-9

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's Document

system (ADAMS). ADAMS is accessible from the NRC web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

Charles R. Ogle, Chief
Engineering Branch 1
Division of Reactor Safety

Enclosure: NRC Inspection Report 50-327/02-03, 50-328/02-03

SUMMARY OF FINDINGS
Sequoyah Nuclear Plant, Units 1and 2

IR 05000327-02-03 and IR 05000328-02-03 on 03/25-29/2002,Tennesee Valley Authority, Sequoyah Nuclear Plant Units 1 and 2, triennial baseline inspection of the fire protection program.

The inspection was conducted by a Brunswick resident inspector, and three regional reactor inspectors. The inspection identified two ~~n~~Non-cited violations which were determined to be of very low safety significance (Green). The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609 "Significance Determination Process." Findings for which the SDP does not apply are indicated by "No Color" or by the severity level of the applicable violation. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described at its Reactor Oversight Process website at http://nrr10.nrc.gov/NRR/OVERSIGHT/index.html.

Inspector Identified Findings

Cornerstone: Mitigating Systems

- Green. A ~~n~~Non-cited violation of 10 CFR Part 50, Appendix R III.G.2, was identified for failure to ensure that one of the redundant trains of a system necessary to achieve and maintain hot shutdown conditions in the event of a fire was free of fire damage. ~~E~~Specifically, electrical cables for redundant- charging flow isolation valves 1-FCV-62-90 and 91 were located in Fire Area FAA-029, the Auxiliary Building Corridor, without adequate spatial separation or fire barriers.

  The finding had a credible impact on safety in that fire damage to the unprotected cables could prevent closure of the valves from the main control room (MCR) and challenge the operators' ability to establish adequate injection flow to the reactor coolant pump (RCP) seals. This finding was determined to be of very low safety significance because the ignition frequency was relatively low, fire detection and suppression systems were not degraded, and there were no components in this area whose failure would result in an accident initiator (i.e., loss of offsite power, loss of main feedwater, etc.) so the finding only affected the mitigating systems cornerstone. (Section 1R05.02)

- Green. A ~~n~~Non-cited violation of Technical Specification ~~(TS)~~ 6.8.1.a. was identified for inadequate procedure guidance related to the transition from abnormal operating procedure (AOP)-N.01, Plant Fires, to AOP-C.04, Shutdown From Auxiliary Control Room, in the event of a severe fire in the control building. AOP-N.01 did not clearly delineate what conditions would require entry into AOP-C.04 and evacuation of the MCR). Also, AOP-N.01 did not direct operators to enter AOP-C.04 in the event of a severe fire in the control building.

  This finding had a credible impact on safety, in that, the inadequate guidance in procedure AOP-N.01 could delay entry into AOP-C.04 and could challenge the operators' ability to perform certain critical safe shutdown functions (e.g., isolate normal charging,

establish adequate seal injection flow to the RCPs) within the times specified in the licensee's safe shutdown calculation for Appendix R. This finding was determined to be of very low safety significance because it did not affect fire detection, fire suppression, or fire barriers. (Section 1R05.05)

- ~~(Green). A finding was identified, in that;~~

  ~~This finding had a credible impact on safety, in that;~~

  ~~(Section 1R05.0X)~~

Licensee identified Findings

- Two violations of very low safety significance which were identified by the licensee were reviewed by the inspection team. Corrective actions taken or planned by the licensee appear reasonable. ~~These violations are listed~~ (Section 4OA7~~.~~)

Report Details

2. REACTOR SAFETY
Cornerstones: Initiating Events, Mitigating Systems

1R05 FIRE PROTECTION

.01 Systems Required To Achieve and Maintain Post-Fire Safe Shutdown (SSD)

a. Inspection Scope

The team evaluated the licensee's fire protection program against applicable requirements, including the Sequoyah Nuclear (SQN) Units 1 and 2 fire protection License Conditions 2.C(16) and 2.C(13) respectively, Fire Protection; Title 10 of the Code of Federal Regulations Part 50 (10 CFR 50), Appendix R III.G, III.J, III.O, and III.L; Appendix A of Branch Technical Position (BTP) Auxiliary and Power Conversion Systems Branch (APCSB) 9.5-1; 10 CFR 50.48; related NRC Safety Evaluation Reports (SERs); NUREGS and the Technical Specifications (TS).

The team used the licensee's Individual Plant Examination for External Events (IPEEE) and in-plant walkdowns to select four risk significant fire areas (FAs) for inspection. The four fire areas selected were:

Fire Area FAA-029, Auxiliary Building, Elevation 690: Auxiliary Building Corridor

This ~~fire area~~ (FA) includes rooms 690.0-A1, A9, A10,A13, A14, A17, A18, A22, A23, A23a, A24, A27, A30 and A31. This area contains both trains of safe shutdown equipment or cables and is classified as a 10 CFR Part 50 Appendix R, III.G.2 area. A significant fire in this area would require shutdown of either unit from the main control room (MCR).

Fire Area FAA-067, Auxiliary Building, Elevation 734: 6.9 kilovolt (kV) Shutdown Board Rooms

This FA includes rooms 734.0-A2 and A9. This fire area includes both units train 'A' auxiliary electric power switchgear. This area is classified as a 10 CFR Part 50 Appendix R, III.G.2. A significant fire in this fire area would require shutdown of either unit from the MCR ~~and involve the respective units centrifugal charging pumps (CCP) 1(2) B-B, the turbine drive auxiliary feedwater (TDAFW) pump and the train 'B' residual heat removal (RHR) pumps 1(2)B-B~~.

Fire Area FAC-009, Control Building, Elevation 685: Unit 1 Auxiliary Instrument Room

This FA includes controls to important safe shutdown (SSD) equipment from the control room. This area is classified as a 10 CFR Part 50 Appendix R, III.G.3 area. A significant fire in this area would involve evacuation of the MCR and alternative shutdown from the

remote shutdown panel using the Auxiliary Control Room (ACR) located in the Auxiliary Building.

Fire Area FAC-20, Control Building, Elevation 732: Relay Room

This FA includes high voltage electrical relay equipment for offsite power and is located adjacent to the MCR complex. A significant fire in this area may result in a fire induced loss of offsite power (LOOP). This area is classified as a 10 CFR Part 50 Appendix R, III.G.3 area. A fire in this area would require evacuation of the MCR and alternate shutdown from the remote shutdown panel using the ACR located in the Auxiliary Building.

— The team reviewed the IPEEE, –Appendix A to ~~C~~calculation SQN-26-D054/EPM-ABB-IMPFHA - Fire Hazards Analysis (FHA), the Sequoyah Fire Protection Report (FPR), associated procedures, and system drawings to identify those systems credited for SSD of the facility in the event of a fire in the selected fire areas. The inspection included review of the post-fire SSD capability and the fire protection features to ensure that at least one post-fire SSD success path was maintained free of fire damage in the event of a fire.

For a selected sample of SSD systems, components, and plant monitoring instruments, the team reviewed the SQN Fire Protection Report, the FHA, applicable fire protection related SERs and NUREGS, and system flow diagrams to evaluate the completeness and adequacy of the FPR and the systems relied upon to mitigate fires in the selected fire areas.

The team inspected the capability to shutdown for the scenario where a fire in FA FAC-20, Relay Room, could initiated a LOOP. The ~~inspection was done by reviewing~~team inspected the control circuits and associated circuit analysis for the diesel generators to determine whether any devices in the control circuit were located in ~~FAC-20. The licensee's circuit analysis was also reviewed to determine whether the diesel generator control circuit was analyzed in relation to~~FA FAC-20. In a similar manner, the control circuits for the 6.9 kV shutdown board incoming circuit breakers (i.e. offsite power and diesel generator breaker) were reviewed to determine whether a fire in FA FAC-20 could interfere with opening of the offsite breaker or closing the diesel generator breaker.

b. Findings

No findings of significance were identified.

.02 Fire Protection of Safe Shutdown Capability

a. Inspection Scope

The team reviewed the licensee's the FPR for FAs FAA-029 and FAA-067 to determine whether redundant trains of components or circuits required for safe shutdown were located in the same ~~fire area~~FA. From those components, the team selected the centrifugal charging pumps 1A and 1B power cables, and the charging flow isolation

valves 1-FCV-62-90 and 91 power and control cables to verify that adequate spatial separation or proper fire barrier protection features were installed in accordance with the design requirements of 10 CFR 50 Appendix R. For the selected cables the team examined cable routing, raceway drawings, the actual configuration of the circuits, fire barriers, ~~and~~ fire detection, and fire suppression equipment as applicable for conformance to ~~the requirements~~applicable NRC requirements and National Fire Protection Association (NFPA) standards. In addition the team walked down these ~~fire areas~~FAs to verify that the licensee documentation reflected the as-built configuration.

Team members also walked down the selected ~~fire areas~~FAs and compared the associated fire fighting ~~pre-plan procedures~~pre-plans and drawings with as-built plant conditions. This was done to verify that they were consistent with the fire protection features and potential fire conditions described in the FPR. Additionally, the team reviewed engineering evaluations associated with the reactor auxiliary building floor and equipment drain sump capacity to verify that ~~the fire brigade and operator~~those actions required for post-fire alternative SSD would not be inhibited by fire suppression activities or leakage from fire suppression systems. The team reviewed fire brigade response, training, and drill program procedures. Fire brigade drill critiques for operating shifts from 1999 until 2001 as well as fire brigade training/drill records for the same period were reviewed to verify that fire brigade drills had been conducted in high fire risk plant areas and that ~~the~~ fire brigade personnel qualifications, brigade drill response, and brigade performance met the requirements of the licensee's approved fire protection program.

The team reviewed selected portions of the SQN FHA and plant fire prevention/combustible hazards administrative control procedures to verify that the conditions established in various fire protection licensing basis documents were satisfied. The team performed walkdowns of the four selected plant ~~fire areas~~FAs to observe whether the licensee's activities to limit fire hazards were implemented consistent with procedures. The team reviewed the ~~January 1999 through December 2001~~ fire brigade response fire emergency/incident reports from 1999 through 2001, as well as the plant Problem Evaluation Reports (PERs) resulting from fire, smoke, sparks, arcing, and equipment overheating incidents ~~for the years 1999-2001~~. This review was conducted to assess the effectiveness of the fire prevention program and to identify any maintenance or material condition problems related to fire incidents. Additionally, design control procedures were reviewed to verify that plant changes were adequately reviewed for the potential impact on the fire protection program, SSD equipment, and procedures as required by SQN license conditions 2.C(16) and 2.C.(13).

The team walked down the primary fire brigade staging and dress-out areas to assess the condition of fire fighting and smoke control equipment. Fire brigade personal protective equipment located in the fire brigade house, dress-out area and lockers in the ~~service building~~ fire brigade staging area were reviewed to evaluate equipment accessibility and functionality. The team observed whether emergency exit lighting was provided for personnel evacuation pathways to the outside exits as identified in the ~~National Fire Protection Association (~~NFPA~~)~~ 101, Life Safety Code. This review also included examination of whether backup emergency lighting was provided for access pathways to and within the fire brigade staging and dress-out areas in support of fire brigade operations should power fail during a fire emergency. The adequacy of the fire

brigade self-contained breathing apparatus (SCBAs) was reviewed as well as the availability of supplemental breathing air tanks.

The team reviewed the ~~RCP oil~~RCPoil collection system enclosure drawings to verify compliance with 10 CFR 50 Appendix R Section III.O. This review included evaluation of operator response procedures to determine if sufficient procedural guidance was provided to the plant operators so they would be able to identify an oil leak from the lubrication system of one of the RCP motors and take appropriate action.

b. Findings

A ~~n~~Non-cited violation (Green) of 10 CFR Part 50, Appendix R, Section III.G.2, was identified for failure to ensure that one of the redundant trains of a system necessary to achieve and maintain hot shutdown conditions in the event of a fire was free of fire damage. Electrical cables for redundant charging flow isolation valves 1-FCV-62-90 and 91 were located in ~~Fire Area~~FA FAA-029, the Auxiliary Building Corridor, without spatial separation or fire barriers.

For a fire in FAA-029, the FHA indicated that reactor coolant system (RCS) inventory control was achieved through isolation of normal charging and letdown while maintaining RCP seal flow cooling. Through review of associated system prints and safe shutdown procedures AOP-N.01 and AOP-N.08, the team noted that the steps to achieve charging flow isolation while continuing RCP seal flow cooling from the main control room was to close either valve 1-FCV-62-90 or 91. These valves were in series and powered from redundant power sources. The FHA indicated that power and control cables for both these valves were routed closer than the 20 feet specified in Appendix R, III.G.2.b in a relatively small sub-area of ~~Fire Area~~FA FAA-029. Conduit Drawings 1,2-45N824-7 and 1,2-45N824-16 depicted the routing for these cables. From a walkdown of the cable routing the team verified that there was a location where the unprotected cables for valves 90 and 91 were separated by approximately 16 feet such that they could be damaged by a severe fire. The team noted that, in lieu of protecting the 90 and 91 cables in accordance with Appendix R, so they could be operated from the main control room, the licensee incorporated steps in the shutdown procedure AOP-N.08 to manipulate manual valve 537 or 539.

The fact that cables for both the charging flow isolation valves could be damaged by a credible fire in FAA-029 had greater than minor significance because it could affect the RCP seal injection flow and RCP seal integrity. The finding was found to have credible impact on safety in that fire damage to the unprotected cables could prevent closure of the valves from the MCR and challenge the operators' ability to establish adequate flow to the RCP seals. The ignition frequency for the sub-area in question was taken from ~~the~~theSQN IPEEE as 1.85E-3 per year. The team observed that fire detection and suppression was installed throughout ~~Fire Area~~FA FAA-029. Manual suppression capability and the automatic suppression system were deemed to be in the normal operating state by the team. The fire mitigation frequency was conservatively calculated to be once per 10^5 years. The missing barrier condition existed for greater than 30 days. Based on these factors, the finding was processed using the Phase 2 transient sheet and subsequently characterized by the Significance Determination Process as having very

low risk significance (Green). This was because the ignition frequency was relatively low, fire detection and suppression systems were not degraded, and there were no components in this area whose failure would result in an accident initiator (i.e., loss of offsite power, loss of main feedwater, etc.) so the finding only affects the mitigating systems cornerstone.

The ~~finding, i.e. cables for both~~failure to protect cables with an adequate fire barrier or provide 20 foot separation between redundant charging flow isolation valves ~~being unprotected by a barrier and routed with less than 20 foot separation,~~ is a violation of 10 CFR 50, Appendix R, III. G. 2. b, which requires that unprotected cables of redundant trains be separated by a horizontal distance of greater than 20 feet. The violation is being treated as a ~~n~~Non-cited violation and is identified as NCV 50-327/02-003-01. The licensee documented the violation in PER 02-03645.

.03 Post-Fire SSD Circuit Analysis

a. Inspection Scope

~~On a sample basis, t~~The team verified that selected cables of equipment required to achieve and maintain hot shutdown conditions in the event of fire in selected ~~fire areas~~FAs had been properly identified and either adequately protected from the potentially adverse effects of fire damage or analyzed to show that fire-induced faults (e.g., hot shorts, open circuits, and shorts to ground) would not prevent safe shutdown. The team selected power, control and instrumentation circuits indicated to be credited for safe shutdown in the licensee's FHA and walked down the routing of the circuits. The circuits selected were:

Fire Area FAA-067: 1-L068-335, Pressurizer level indication

Fire Area FAC-009: FI-3-163C, Auxiliary feedwater flow to steam generator 1.

Fire Area FAC-20: Diesel generator start button

Additionally~~, on a sample basis~~ the team reviewed ~~the~~selected licensee's electrical coordination studies to verify that fire induced faults on energized non-shutdown circuits would not prevent the success of the SSD functions. Specifically, the team reviewed overcurrent protection devices related to the control circuit for centrifugl charging pump (CCP) 1A from power source at 125 volt (V) vital battery board 1 to the circuit breaker close and trip circuits. ~~M~~The manufacturer's time-current characteristics were checked and installed devices were examined and compared to design information. ~~With regard~~The team reviewed tohe coordination of overcurrent devices on the alternating current (AC) system~~, the team determined f~~. From the licensee's FHA ~~which~~, the team reviewed those buses ~~were~~ credited for a fire ~~in fire area~~inFA FAA-029. Phase faults and ground faults on the 6.9 kV system were considered, and a review of the 6.9kV system coordination was performed for a phase fault on a cable emanating from 480 V shutdown board 1A1-A, reactor MOV board 1A1-A and ERCW MCC 1A-A. To the extent possible installed devices were examined and compared to design documents.

b. Findings

~~[this section may be deleted based on additional licensee review of condition]~~

~~The team identified a performance issue of very low significance involving mis-coordination of overcurrent protection relays.~~

~~The team reviewed the coordination between overcurrent relay C51GN installed at the neutral of common station service transformer C 6.9 kV (CSST-C) y-winding and overcurrent relay 51N relay which was installed at circuit breaker 1418 to provide protection against excess current as a result of excess current on Start Bus 1B. The team noted through review of electrical one-line drawings of the distribution system that the RCPs for both units were powered from Start Bus 1B and Start Bus 2B. The team determined that if a lower level single line to ground fault of 600 A was generated on Start Bus 1B or cables connecting the start bus to the associated unit boards, the 51N relay may not respond due to the 600 A ground fault being below the 51N's pick up set point. In contrast, the C51GN relay was set at 72 A, which was low enough to trip breakers and de-energize the CSSTR-C which supplied both Start Bus 1B and Start Bus 2B. The team determined that due to the inadequate coordination between the C51GN a single line to ground fault on start bus 1B could result in a Unit 1 trip due to loss of critical loads such as RCPs. More significantly, the tripping of the CSST rather than the start bus could result in the tripping of not just Unit 1 but Unit 2 as well.~~

~~This issue has a credible impact on safety due to the increased likelihood of the loss of critical loads such as the RCPs on both units. This issue affects the initiating events cornerstone due to the potential to increase the likelihood that the Start Bus 2B would trip as a result of a ground fault on the other unit. As the finding does not contribute to likelihood of a loss of coolant accident (LOCA) initiator, affect mitigation equipment, nor increase the likelihood of a fire or flood, the finding screened as Green.~~

No findings of significance were identified.

.04 Alternative Shutdown (ASD) Capability

a. ~~Inspection Scope~~

The team reviewed the licensee's procedures for fire response and ASD capability for the ~~fire areas~~FAs selected to verify conformance with applicable requirements as discussed in Section 1R05.01 above. This review included the licensee's ASD methodology to determine the adequacy of the identified components and systems to achieve and maintain safe shutdown. The review also included verifying that the methodology addressed achieving and maintaining hot and cold shutdown from outside the MCR, with or without off-site power available. The team also reviewed the licensee's procedures to verify their consistency with the calculations and assumptions supporting the operator actions identified in the ASD methodology.

~~Additionally, for cases~~The team selected several circuits where the control or instrumentation devices were determined to be located at the auxiliary control panel or other local panels~~, t~~. The team reviewed ~~the~~ relevant drawings to determine whether

isolation devices were appropriately designed into the ~~circuitry as appropriate. The~~ following circuits ~~were reviewed~~:

- Control circuit for the centrifugal charging pump
- AFW flow to the steam generator FI-3-163C
- Volume control tank outlet isolation valve LCV-62-132 (MOV)
- CCP flow to RCS coolant loop 1 FCV-62-85 (AOV)
- Source range flux monitor XI-92-5

~~Verifying~~The team verified that hot and cold shutdown ~~can~~could be maintained from outside the MCR without offsite power ~~was addressed~~ through the review of emergency diesel generator (EDG) and breaker circuits.

b. Findings

No findings of significance were identified.

.05 Operational Implementation of Alternative Shutdown Capability

a. Inspection Scope

The team reviewed the operational implementation of post-fire safe shutdown capability for a fire in the selected ~~fire areas~~FAs to verify that: (1) the training program for licensed and non-licensed personnel included alternative or dedicated SSD capability; (2) personnel required to achieve and maintain the plant in hot standby from outside the MCR could be provided from normal onsite staff, exclusive of the fire brigade; (3) adequate procedures existed for use during ASD; and (4) the licensee periodically performed operability testing of the SSD instrumentation and transfer and control functions. The team reviewed the contents of selected safe shutdown lockers to verify that materials needed to support implementation of operator actions specified in the ASD procedures for hot standby were available and ~~being~~ properly maintained. Fire brigade staffing was reviewed to verify that it met the requirements of the licensee's fire protection program. Training requirements were reviewed for the fire brigade members and related support personnel such as incident commander (IC), reactor operator (RO), senior reactor operator (SRO), and auxiliary operators to verify compliance with the licensee's fire protection program. Lesson plans and job performance measures (JPMs) were reviewed to ~~verify that~~determine whether ASD activities were included in the training program.

Post-fire safe shutdown procedures for the selected areas were reviewed to determine if adequate staffing and appropriate guidance was provided for the operators to identify protected equipment and instrumentation and those recovery actions specified in post-fire shutdown procedures. considered manpower needs for performing restorations and area accessibility. Specific procedures reviewed included Abnormal Operating

Procedure (AOP)-N.01, Plant Fires, Revision (Rev)14; AOP-N.08, Appendix R Fire Safe Shutdown, Rev 0; AOP-C.04, Shutdown From Auxiliary Control Room, Rev 4. Selected procedure sections were walked down to verify that the procedures could be performed within the times specified in the supporting calculations, given the minimum required staffing level of operators, concurrent with a loss of offsite power. Additionally, the team walked down the designated pathways and reviewed the licensee's smoke control procedures, ventilation systems, and the availability of SCBAs to verify that environmental conditions, such as smoke and heat, would not prevent operators from performing the procedures.

b. Findings

One finding of very low safety significance (Green) was identified as a nNon-cited violation (NCV) of Technical Specification (TS) 6.8.1.a. for inadequate procedure guidance related to the transition from AOP-N.01, Plant Fires, to AOP-C.04, Shutdown From Auxiliary Control Room, in the event of a severe fire in the Control Building.

On March 27, 2002, the team identified that the guidance contained in AOP-N.01 was not adequate to transition operators to AOP-C.04, in that, AOP-N.01 did not clearly delineate what conditions would require entry into AOP-C.04 and evacuation of the MCR. Also, AOP-N.01 ~~did not~~failed to direct operators to enter AOP-C.04 in the event of a severe fire in the Control Building. The lack of clear guidance in AOP-N.01 was noted during a walkthrough by the team of the procedures AOP-N.01 and AOP-C.04 with operations personnel. The team observed that the lack of adequate guidance in AOP-N.01 appeared to contribute to the operators' confusion regarding the entry conditions for AOP-C.04 and the transition from AOP-N.01 to AOP-C.04. This team determined that the confusion could cause the operator to delay entry into AOP-C.04 and the performance of time critical ASD actions.

This finding had a credible impact on safety, in that the inadequate guidance in procedure AOP-N.01 could delay entry into AOP-C.04 and could challenge the operators' ability to perform certain critical safe shutdown functions (e.g., isolate normal charging, establish adequate seal injection flow to the RCPs) within the times specified in licensee calculation SQN-SQS4-0127, Equipment Required for Safe Shutdown Per 10 CFR50 Appendix R, Rev 21. This finding affected the mitigating systems cornerstone and was determined to be of very low safety significance (Green) using Attachment F to the Significance Determination Process (SDP), because it did not affect fire detection, fire suppression, or fire barriers.

Sequoyah Technical Specification 6.8.1.a. and Regulatory Guide 1.33, Rev 2, Appendix A, Item 6.v, requires, in part, that written procedures be established, implemented, and maintained for plant operations during emergencies such as plant fires. Embodied in this requirement is that the procedures have to be adequate. Contrary to the above, the licensee failed to establish adequate procedural guidance in AOP-N.01, Plant Fires, to provide sufficient guidance to operators with regard to what conditions would require entry into AOP -C.04 for safe shutdown from outside of the MCR.

Because of the very low safety significance of this issue and because the licensee has entered this issue in their corrective action program as PER 02-003550, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy. This violation is identified as NCV 50-327, 328/02-03-02, Inadequate Procedure Guidance for Implementing Abnormal Operating Procedures for Plant Fires.

The team noted other observations during the procedure reviews and walkthroughs which could challenge operator performance of safe shutdown activities. The following are examples of the types of observations identified:

- The validation method for the latest revisions to AOP-N.01 and AOP-C.04 lacked thoroughness in that, a "tabletop review" was performed instead of a field validation.

- Time requirements specified in calculation SQN-SQS4-0127 for performing certain critical safe shutdown functions were not incorporated into AOP-C.04.

- AOP-C.04, Checklist 5 required an excessive amount of time (more than 1.5 hours) to complete. The checklist appeared to contain various unnecessary items and was not developed to minimize time. The team noted that an additional field validation of AOP-C.04, Checklists 5 and 6 was performed the week of March 11, 2002. However, this validation verified accuracy of component identifiers and tags, but did not evaluate timeliness.

- AOP-C.04 and AOP-N.08 were inconsistent in specifying the time required to re-establish seal injection flow to the RCPs (i.e., AOP-C.04 specified as soon as possible and AOP-N.08 specified 15 minutes).

- Weaknesses were identified in the operators' understanding and familiarity with AOP-N.01, AOP-N.08, and AOP-C.04.

.06 Communications for Performance of Alternative SSD Capability

a. Inspection Scope

The team reviewed the licensee's communications systems separation analysis to verify the ~~adequacy~~availability of the communication system to support plant personnel in the performance of alternative safe shutdown functions and fire brigade duties. ~~The team~~Walkdowns were performed ~~walkdowns~~ of sections of the alternative SSD procedure AOP-C.04 to evaluate the adequacy of the plant communication systems to support plant personnel in the performance of alternative SSD functions. The team reviewed the adequacy of credited redundant communications systems and verified the licensee's portable radio channel features would operate should the radio repeaters for the primary communications system be unavailable. The team also examined whether sound-powered phone jacks were present at the locations identified in the alternative shutdown procedure as designated by the SQN Updated Final Safety Analysis Report (UFSAR). This review included examination of the sound powered phone periodic test record and inventory surveillance records of post-fire SSD operator

equipment to assess whether the surveillance test program was sufficient to verify proper operation of the system.

b. Findings

No findings of significance were identified.

.07 Emergency Lighting for Performance of ASD Capability

a. Inspection Scope

The team walked down selected areas where equipment would be controlled or monitored during post-fire shutdown to observe whether battery pack emergency lighting units (ELUs) were installed to allow operation of the equipment if normal lighting was lost. In some cases the installed ELUs were tested to demonstrate functionality, and the locations and identification numbers on the ELUs were compared to design documents to assure the as-built configuration was consistent with the design. The team also reviewed licensee periodic test documentation to verify that the ELUs were being maintained in an operable manner.

b. Findings

No findings of significance were identified.

.08 Cold Shutdown Repairs

a. Inspection Scope

The team randomly selected a component, from the section of the FHA that listed repairs that may be needed to achieve cold shutdown, and evaluated the probability for success of the repair. The component chosen was the RHR system isolation valve 1-FCV-074-001 specified for ~~Fire Area~~FA FAA-029. ~~Considerations applied to this~~The review ~~were~~considered~~hte~~ level of difficulty of the repair as compared to expected skills of the person assigned to perform the task, adequacy of relevant procedures, and the availability of necessary materials ~~etc~~.

b. Findings

No findings of significance were identified.

.09 Fire Barriers and Fire Area/Zone/Room Penetration Seals

a. Inspection Scope

The team walked down the selected ~~fire areas~~FAs to evaluate the adequacy of the fire resistance of ~~fire area~~FA barrier enclosure walls, ceilings, floors, structural steel support protection, fire barrier penetration seals, fire doors, fire dampers, and electrical raceway fire barrier systems (ERFBS) to ensure that at least one train of SSD

equipment ~~was~~would be maintained free of fire damage. The team observed the material condition and configuration of the installed fire barrier features, as well as, reviewed construction details and supporting fire endurance tests for the installed fire barrier features. The team compared the observed fire barrier penetration seal configurations to the design drawings and tested configurations. The team also compared the penetration seal ratings with the ratings of the barriers in which they were installed.

The team reviewed ASD procedures, selected fire fighting pre-plan procedures, and heating ventilation and air conditioning (HVAC) systems to verify that access to remote shutdown equipment and operator manual actions would not be inhibited by smoke migration from one area to adjacent plant areas used to accomplish SSD.

In addition, the team reviewed the licensing documentation, Generic Letter (GL) 86-10 engineering evaluations of fire barrier features, and engineering evaluations for NFPA code deviations to verify that the fire barrier installations met design requirements and license commitments.

b. Findings

No findings of significance were identified.

.10 Fire Protection Systems, Features, and Equipment

a. Inspection Scope

The team reviewed flow diagrams, cable routing information, periodic test procedures, engineering evaluations for NFPA code deviations, and operational valve lineup procedures associated with the electric driven high pressure service water fire pumps and fire protection water supply system. The review was to determine whether the common fire protection water delivery and supply components could be damaged or inhibited by fire-induced failures of electrical power supplies or control circuits. Additionally, team members walked down portions of the fire protection water supply system in the selected areas to assess the material condition, operational effectiveness, and whether the installed configurations were within the parameters of the engineering evaluations.

The team verified that adequate fire protection features were installed in accordance with the separation and design requirements in Appendix R to 10 CFR Part 50, Section III.G.2. The team walked down accessible portions of the fire detection and alarm systems in the selected plant areas to evaluate the engineering design and operation of the installed configurations. The team also reviewed engineering drawings for fire detector spacing and locations in the selected plant areas to verify effectiveness of the systems and compliance with the licensee's FPR and associated NFPA ~~C~~code of ~~R~~record. Team members walked down the selected areas with sprinklers to assure proper placement and spacing of the sprinkler heads and the lack of sprinkler head obstructions. The team ~~also~~ reviewed design calculations to verify that the required fire hose water flow and sprinkler system density for each protected area were available.

The team reviewed a sample of manual fire hose lengths to verify that they could reach the SSD equipment. Additionally, the team verified whether the ~~design and~~ placement of the manual fire fighting fire hose equipment and fire extinguishers were properly reflected in the fire brigade pre-fire plans.

The team reviewed the adequacy of the design and installation of the carbon dioxide (CO_2) fire suppression system for ~~fire area~~the FA FAC-009~~, the Unit 1 Auxiliary Instrument Room~~. This review included CO_2 fire suppression system controls to assure accessibility and functionality of the system and associated ventilation system fire dampers. The team also reviewed licensee design calculations, vendor certifications, and pre-operational test data to verify that the required quantity of CO_2 for the areas was available. Additionally, the team reviewed several drawings, schematics, flow diagrams, and evaluations associated with the area floor drain system to verify that systems and operator actions required for alternative SSD would not be inhibited through potential leakage from CO_2 fire suppression activities.

b. Findings

No findings of significance were identified.

.11 Compensatory Measures

a. Inspection Scope

The team reviewed several licensee identified deficiencies, which dealt with maintaining one redundant train of SSCs free from fire damage in accordance with 10 CFR 50 Appendix R III.G.2. The review was performed to verify that the risk associated with the adverse conditions were properly assessed and adequate compensatory measures adequately considered IPEEE risk insights and were implemented in accordance with the approved fire protection program.

b. Findings

No findings of significance were identified.

.12 Identification and Resolution of Problems

a. Inspection Scope

The team reviewed a sample of PERs related to fire protection and protection of SSCs for SSD in accordance with 10 CFR 50 Appendix R III.G, III.J. and III.O to verify that items were captured in the licensee's corrective action program in accordance with SPP-3.1, Corrective Action Program, Rev 4. The items selected were reviewed for classification and for the appropriateness of the corrective actions taken to resolve the issues. The team reviewed self-assessments and audits related to the fire protection and safe shutdown programs to assess whether the licensee was performing comprehensive audits of these programs in accordance with the requirements set forth in Appendix A of BTP APCSB 9.5-1.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA6 Meetings

Exit Meeting Summary

The team presented the inspection results to Dennis Cole, and other members of licensee management and staff at the conclusion of the inspection on March 28-29, 2002 and on April 24, 2002. The licensee acknowledged the findings presented. No proprietary information is included in this report.

40A7 Licensee Identified Violations

The following findings of very low significance were identified by the licensee and are violations of NRC requirements which met the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600 for being dispositioned as NCVs.

NCV Tracking Number	Requirement Licensee Failed to Meet
50-327, 328/02-03-03	10 CFR 50 Appendix III.J states that emergency lighting units with at least an 8-hour battery power supply shall be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto. The licensee identified during a self-assessment that the need for emergency lighting for the 1~~(2) FCV-63-001~~, 2FCV-63-001 had not been provided. Manual operation of these valves is required in the event of a severe fire in accordance with licensee shutdown procedures. ~~The failure to provide adequate illumination of~~ manual actions required for safe shutdown is identified as a ~~n~~Non-cited violation of 10 CFR 50, Appendix R III.J. The issue is in the licensee's corrective action program as PER 02-000550-000 (Green).
50-327, 328/02-03-04	10 CFR 50 Appendix R III.G. 2. states that except as provided for in paragraph G.3 of this section, where cables or equipment, including associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same ~~fire area~~FA outside of primary containment, one of the following means of ensuring that one of the redundant

trains is free of fire damage shall be provided: (a.) Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier; (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 ~~fire area~~FA; or (c.) Enclosure of cable and equipment and associated non-safety circuits of one redundant train in 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~~FA. The licensee identified during a self-assessment that as a result of inadequate protection to the control/and or control cables a spurious closure signal to the VCT level control valves was credible. As the power cables for the RWST suctions valves are in the same ~~fire area~~FA and not protected there was an interaction which existed such that suction to both the VCT and RWST could be lost. The licensee's failure to provide adequate protection to prevent the operation or the maloperation of cables or equipment necessary to achieve and maintain hot shutdown is identified as a ~~n~~Non-cited violation of 10 CFR 50 Appendix R III.G.2. The issue is in the licensee's corrective action program as PER 02-000576-000 (Green).

PARTIAL LIST OF PERSONS CONTACTED

Licensee

J. Bajraszewski, Licensing Engineer
J. Bible, Maintenance and Modifications Manager, SQN
J. Beasley, Site Quality Manager, SQN
P. Boulden, Engineer, SQN
D. Craven, TPS-TOM Service Manager, SQN
T. Davis, Fire Protection Supervisor, WBN
B. Dukes, Engineer, SQN
R. Egli, Fire Protection Systems Engineer, SQN
K. Frazier, Systems Engineer, SQN
E. Freeman, Operations Manager, SQN
R. Gladney, Electrical Design Manager, SQN
J. Gomez, Lead Electrical Engineer, WBN
R. Goodman, Training Manager, SQN
O. Hayes, Operations Support Superintendent, SQN

P. Johnson, Fire Operations, SQN
D. Koehl, Plant Manager, SQN
D. Lundy, Engineering Manager, SQN
J. Patrick, Senior Specialist, SQN
J. Pierce, Engineer, SQN
D. Porter, Operations, SQN
R. Proffitt, Nuclear Engineer, SQN
J. Reynolds, Nuclear Assurance, SQN
R. Rogers, Engineering Design Manager, SQN
P. Salas, Licensing and Industrial Affairs Manager, SQN
B. Simril, Fire Protection Specialist, SQN
J. Smith, Licensing Manager, SQN
J. Thomas, Mechanical/Nuclear Engineering Supervisor, SQN
E. Turner, Electrical Engineering Design, SQN
J. Wilkes, Operations Superintendent, SQN

NRC

C. Payne, Senior Reactor Inspector, RII
R. Tellson, Resident Inspector

ITEMS OPENED, CLOSED, and DISCUSSED

Opened and Closed

50-327/02-03-01	NCV	Failure to Provide Adequate Protection for Cables to Redundant SSD Components (Section 1R05.03)
50-327, 328/02-03-02	NCV	Inadequate Procedure Guidance for Implementing Abnormal Operating Procedures for Plant Fires (Section 1R05.05)
50-327, 328/02-03-03	NCV	Inadequate Emergency Lighting for the RWST Suction Valve (Section 4OA7)
50-327, 328/02-03-04	NCV	Failure to Provide Adequate Protection for Cables to the VCT Suction Valves (Section (4OA7)

Closed

None

Discussed

None

LIST OF ACRONYMS

ACR	-	Auxiliary Control Room
AOP	-	Abnormal Operating Procedure
APCSB	-	Auxiliary and Power Conversion Systems Branch
ASD	-	Alternative Shutdown
BTP	-	Branch Technical Position
CFR	-	Code of Federal Regulations
DC	-	Direct Current
EOP	-	Emergency Operating Procedure
ELU	-	Emergency Lighting Unit
FDW/FW	-	Feedwater
FSAR	-	Final Safety Analysis Report
HVAC	-	Heating, Ventilation, and Air Conditioning
IPEEE	-	Individual Plant Examination for External Events
JPM	-	Job Performance Measure
LP/LPI	-	Low Pressure Injection
MCR		Main Control Room
NCV	-	Non-Cited Violation
NRC	-	Nuclear Regulatory Commission
PER	-	Problem Evaluation Report
PORV	-	Power Operated Relief Valve
PRA	-	Probabilistic Risk Assessment
RCP	-	Reactor Coolant Pump
RCS/RC	-	Reactor Coolant System
SCBA	-	Self-Contained Breathing Apparatus
SDP	-	Significance Determination Process
SER	-	Safety Evaluation Report
SLC	-	Selected Licensee Commitment
SSA	-	Safe Shutdown Analysis
SSD	-	Safe Shutdown
TS	-	Technical Specifications
UFSAR	-	Updated Final Safety Analysis Report
URI	-	Unresolved Item

LIST OF DOCUMENTS REVIEWED

Procedures:

0-AR-M-29, Annunciator Response Fire Detection System, Rev 8
0-PI-OPS-000-708.0, 10CFR50 Appendix R Compliance Verification, Rev 3
1-AR-M5-B, Annunciator Response CVCS Seal Water and RCP, Rev 28
1-SO-77-4, System Operating Instruction for Auxiliary Reactor Building Floor and Equipment
1-PI-OPS-000-010.A, Verification of Remote Shutdown Transfer Switches, Rev 0, Completed 11/13/2001
AOP-C.04, Shutdown From Auxiliary Control Room, Rev 4
AOP-N.01, Plant Fires, Rev 14
AOP-N.08, Appendix R Fire Safe Shutdown, Rev 0
SPP-9.3, Plant Modifications and Engineering Change Control, Rev 6
SPP-10.7, Housekeeping/Temporary Equipment Control, Rev 0S2
SSP-10.10, Control of Transient Combustibles, Rev 1
SSP-10.11, Control of Ignition Sources, Rev 1
~~Drain Sump, Rev 1~~
SMI-0-317-18, Special Maintenance Instruction - Appendix R - Casualty Procedures, Rev 6
0-SI-FPU-031-001.R, Visual Inspection Fire Dampers, Rev 2
0-PI-FPU-317-299.W, Attachment 4, Operations Fire Protection Weekly Inspection, Rev 10
0-SI-FPU-410-703.0, Inspection of FPR Required Fire Doors, Rev 0
0-SI-234.6, Functional Test of Fire Protection Report Required Detectors, Rev 32
FPI-0102, Appendix C Active Permits (Impairments), dated March 26, 2002
Pre-Fire Plan No. AUX-0-690-00, Auxiliary Building, Elevation 690'- 0, Rev 1
Pre-Fire Plan No. AUX-0-690-01, Auxiliary Building, Elevation 690'- 0, Rev 1
Pre-Fire Plan No. AUX-0-690-02, Auxiliary Building, Elevation 690'- 0, Rev 5
Pre-Fire Plan No. AUX-0-734-00, Auxiliary Building, Elevation 734'- 0, Rev 2
Pre-Fire Plan No. AUX-0-734-01, Auxiliary Building, Elevation 734'- 0, Rev 4
Pre-Fire Plan No. AUX-0-734-02, Auxiliary Building, Elevation 734'- 0, Rev 3
Pre-Fire Plan No. AUX-0-734-03, Auxiliary Building, Elevation 734'- 0, Rev 4
Pre-Fire Plan No. CON-0-685-00, Control Building, Elevation 685'- 0, Rev 3
Pre-Fire Plan No. CON-0-732-00, Control Building, Elevation 732'- 0, Rev 4

Job Performance Measures (JPMs) and Lesson Plans:

Lesson Plan OPL273C0202, Appendix R Fires (AOP-N.01, AOP-N.08, AOP-C.04), Rev 0
JPM CRO-005, Evacuate the Control Room, Rev 13
JPM CRO-052, Perform Required Actions in Preparation for Manning the SSF, Rev 4

PERS, Audits, and Self-Assessments:

Fire Protection and Loss Prevention Program Audit (Biennial\Triennial) No. SSA0101
Fire Protection and Loss Prevention Program Audit (Annual) No. SSA0001
Fire Protection and Loss Prevention Program Audit (Triennial) No. SSA9802
Self Assessment Report, SQN-OPS-09-001 Rev 1

Attachment

Self Assessment Report ,SQN-OPS-01-007
PER 00-011423, Sequoyah Does not Perform Periodic Functional Testing on Alternate Shutdown Transfer Switches and Controls, dated 12/15/2000
PER 01-009956, Handswitches Had to be Cycled to Pass Continuity Checks During Performance of Procedure 0-PI-OPS-000-010.A, dated 11/2/2001
PER 01-010214, Discrepancies During Performance of Procedure 1-PI-OPS-000-010.A, dated 11/8/2001

Calculations

SQN-26-D054/EPM-ABB-IMPFHA, Sequoyah Fire Hazards Analysis Calculation, Rev 31
SQN-SQS4-0127, Equipment Required for Safe Shutdown Per 10 CFR 50 Appendix R, Rev 1
SQN-APPR-1, Analysis of AC/DC Instrument and Control (I&C) Power Systems to Identify Associated Circuits - 10 CFR 50, Appendix R, Sheets 16A, 16B, 16C, 17, 37, 46, 54, 76 & 79C of 131, Appendix R Common Power Supply Analysis, Rev 7 [Coordination 125 VDC Vital Battery Board I, II, III & IV]
SQN-APS-003, 480 V APS Class 1E Load Coordination Study, Time-Current Curve # 2, Sheet C-6, Rev 15 [480 V shutdown boards]
SQN-APS-003, 480 V APS Class 1E Load Coordination Study, Time-Current Curve # 3, Sheet C-7, Rev 12 [480 V reactor mov boards]
SQN-APS-003, 480 V APS Class 1E Load Coordination Study, Time-Current Curve # 8, Sheet C-13, Rev 28 [480 V ERCW PMP STA MCCs]

Drawing Numbers

1-47W809-1, Unit 1 Chemical and Volume Control System Flow Diagram, Rev 64
1, 2-47W810-1, Units 1 and 2 Residual Heat Removal System Flow Diagram, Rev 39
1-47W811-1, Unit 1 Safety Injection System Flow Diagram, Rev 57
1, 2-47W813-1, Units 1 and 2 Reactor Coolant System Flow Diagram, Rev 49
2-47W809-1, Unit 2 Chemical and Volume Control System Flow Diagram, Rev 64
2-47W811-1, Unit 2 Safety Injection System Flow Diagram, Rev 48
1,2-45N767-1, Wiring Diagrams 6900 V Diesel Generators Schematic Diagrams Sht-1 Rev 26
1,2-45N767-2, Wiring Diagrams 6900 V Diesel Generators Schematic Diagrams Sht-2 Rev 31
1,2-45N767-3, Wiring Diagrams 6900 V Diesel Generators Schematic Diagrams Sht-3 Rev 23
1,2-45N767-4, Wiring Diagrams 6900 V Diesel Generators Schematic Diagrams Sht-4 Rev 20
1,2-45N767-5, Wiring Diagrams 6900 V Diesel Generators Schematic Diagrams Sht-5 Rev 15
1,2-45N765-1, Wiring Diagrams 6900 V Shutdown Aux Power Schematic Diagram Sht-1, Rev 14 [6900 V Shutdown board 1A-A normal feeder breaker 1718]
1,2-45N765-2, Wiring Diagrams 6900 V Shutdown Aux Power Schematic Diagram Sht-2, Rev 16 [6900 V Shutdown board 1A-A emergency feeder breaker 1912]
1-45E890-104-1, 10 CFR 50 Appendix R RCS Pressure Control Operational & Spurious CA Keys 1,2,4,5,6&9, Rev 4 [conduit and tray plan for charging pump cables in FAA-029]

1,2-45N824-7, Conduit & Grounding Floor Elevation 690.0 Ceiling Plan, Rev 2 [conduit plan for 62-90 & 91 valve cables]
1,2-45N824-16, Conduit & Grounding Floor Elevation 690.0 Details - Sht-4, Rev 0 [conduit plan for 62-90 valve cables]
1,2-45N826-8, Conduit & Grounding Floor Elevations 706.0 & 714.0 Ceiling Plan, Rev 2, [Routing of pressurizer level circuits]
1-45E890-103-1, 10 CFR 50 Appendix R RCS Inventory Control Operational & Spurious CA Keys 1,2,4,5,6 & 9, Rev 3 [Routing of pressurizer level circuits]
1-45E890-103-2, 10 CFR 50 Appendix R RCS Inventory Control Operational & Spurious CA Keys 1,2,4,5,6 & 9, Rev 1, [Routing of pressurizer level circuits]
1-45E890-102-2, 10 CFR 50 Appendix R RCS Inventory Control Operational & Spurious CA Keys 1,2,4,5,6 & 9, Rev 1, [Routing of pressurizer level circuits]
1-47W610-3-3, Mechanical Control Diagram Auxiliary Feedwater System, Rev 17
1,2-45N812-5, Conduit & Grounding Floor 685.0 Details - Sht 3, Rev 1 [Routing of cables for diesel generator start button]
1,2-45N765-16, Wiring Diagrams 6900 V Shutdown Aux Power Schematic Diagram Sht-16, Rev 17 [Centrifugal charging pumps]
1,2-15E500-1, Key Diagram Station Aux Power System, Rev 22
1,2-45N779-11, Wiring Diagrams 480 V Shutdown Aux Power Schematic Diagram Sht-11, Rev 24, [MOV LCV-62-132]
1,2-45N662-1, Wiring Diagrams Chemical & Volume Cont Sys Schematic Diagram Sht-1, Rev 10, [AOV LCV-62-85]
1-47W610-92-1, Mechanical Control Diagram Neutron Monitoring System, Rev 3
1,2-47A381-111, Mechanical Heating & Ventilation & Air Conditioning Dampers, Rev 3
1,2-47A381-113, Mechanical Heating & Ventilation & Air Conditioning Dampers, Rev 2
1,2-47W494 series, Fire Protection Fire Cells, Rev 6
1,2-47W600-250, Mechanical Instruments and Controls Fire Detectors, Rev 5
1,2-47W600-254, Mechanical Instruments and Controls Fire Detectors, Rev 2
1,2-47W610 series, Control Diagram High Pressure Fire Protection System, Rev 21
1,2-47W611 series, Logic Diagram Fire Detection System, Rev 12
1,2-47W849-1, Flow Diagram Hydrogen System for Generator Cooling, Rev 31
1,2-47W850-2, Flow Diagram Fire Protection, Rev 25
1,2-47W850-6A, Connectivity Diagram Fire Protection System, Rev 0
1,2-47W866-2, Flow Diagram Heating & Ventilation Air Flow, Rev 11
1,2-47W866-4, Flow Diagram Heating & Ventilation Air Flow, Rev 32
1,2-47W880-26, Conduit and Grounding Cable Tray Fire Stop, Rev 2
1,2-48W990-1, Miscellaneous Steel Fire Protection Reactor Coolant Pump Hood, Rev 3
1,2-48W991-1, Miscellaneous Steel Fire Protection Reactor Coolant Pump, Rev 6
1,2-47W920-8, Mechanical Heating & Ventilation & Air Conditioning, Rev 3

Other Documents Reviewed:

Bussman Mfg. Div. Time-current Characteristic Curve No. 50980, dated 2/4/99, for KLC and KTN-R fuses

Attachment

Bussman Mfg. Div. Form 236, dated 10/17/70, Total Clearing Time-Current Characteristic Curves for FRN Fusetron Fuses
Westinghouse Electric Corporation, Application Data 29-261, Circuit Breaker Types EB, EHB FB, Mark 75 HFB [Time-Current Characteristic]
Gould Inc. Class L Form 480 Amp-Trap Fuse Total Clearing Time Data 200 - 600 Amp A4BY
ITE Corp Publication IB-18.1.7-2, page 3, Ground Protection Systems [cover GR-5 relay]
Various "Integrated Cable & Raceway Design System" Sheets
Various cable block diagrams prepared as part of the Fire Hazards Analysis
Various drawings associated with DCN MO1443A Showing routing of cables for pressurizer level circuits
Relay Information Setting and Test Record Overcurrent and Ground Relays:
- Sheet No. 1817, dated 6/19/92 [for relays in CSS transformer C neutral]
- Sheet No. 1986, dated 11/21/82 [for relays at breaker 1418]
- Sheet No. 7911, dated 1/8/90 [for relays at breaker 1622]
- Sheet No. 760279R1, 8/24/98 [for relays at breaker 1714]
- Sheet No. 774579R2, dated 11/30/01 [for reactor coolant pump 2]
- Sheet No. 7609, dated 11/27/79 [for relays at breaker 1718]
- Sheet No. 178793R1, dated 11/30/01[for essential raw cooling water pump J-A]

Fire Protection Report, Part V, Table V-1, 8 Hour Emergency Lighting Units, Rev 9
Factory Mutual Research, Tests on Sprinklers, dated April, 29, 1983
Memorandum, TVA to NRC, Final Closeout Regarding Resolution of Thermo-Lag 330-1 Fire Barrier Upgrades, dated June 30, 1999
NRC Integrated Inspection Report No. 50-327, 328/97-03, dated May 12, 1997
NRC Integrated Inspection Report No. 50-327, 328/98-07, dated August 4, 1998

Correspondence:

Memorandum, To: W.S. Raughley, Chief Electrical Engineering Branch, From R.L. Morley, Chief, Central Laboratories Branch, on the subject of "Peak Let Through Test" [for limitron KLC-15 fuse]

Applicable Codes and Standards

NFPA 12, Carbon Dioxide Extinguishing Systems, 1973 Edition
NFPA 13, Standard for the Installation of Sprinkler Systems, 1975 Edition
NFPA 14, Standard for the Installation of Standpipe and Hose Systems, 1974 Edition
NFPA 20, Standard for the Installation of Centrifugal Fire Pumps, 1993 Edition
NFPA 30, Flammable and Combustible Liquids Code, 1973 Edition
NFPA 72D, Standard for the Installation, Maintenance, and Use of Proprietary Protection Signaling Systems, 1975 Edition
NFPA 72E, Standard on Automatic Fire Detectors, 1974 Edition
NFPA 80, Standard on Fire Doors and Windows, 1981 Edition
NFPA 101, Life Safety Code, 1996 Edition

NUREG-1552, Supplement 1, Fire Barrier Penetration Seals in Nuclear Power Plants, dated January 1999

PERs Written During This Inspection

PER 02-02866, Incorrect Categorization of Fire Protection PERs
PER 02-03510, Availability of Sound Powered Phones
PER 02-03527, Lack of Adequate Relay Coordination for the Common Service Station Transformer
PER 02-03530, Lack of Procedural Steps for Cold Shutdown Repair
PER 02-03543, Shift Incident Commander Training on AOP-N.08
PER 02-03550, Deficiencies in AOP-C.04 Procedure Validation
PER 02-03552, OnShift Familiarity with Plant Fire and Appendix R Procedures
PER 02-03564, Fire Equipment Area Emergency Lighting
PER 02-03565, Cardox Floor Drain Loop Seal PM
PER 02-03566, Fire Fighting Effects on the Performance of Electrical Equipment Manipulation
PER 02-03645, Potential NRC Violation for Inadequate Cable Separation