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SQN FIRE PROTECTION REPORT (FPR)
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TVAN FIRE PROTECTION REPORT APPROVAL PAGE

SEQUOYAH NUCLEAR PLANT
FIRE PROTECTION REPORT

Revision 5

Effective Date: ~~6/2/00~~ ~~6/3/00~~ ~~5/26/00~~ 5/24/00 BJS 5/26/00 Changed per B. Simril

Technical Review: _____ Date 5/17/00
Site Engineering-Fire Protection

CWB

Technical Review: _____ Date 5/17/00
Site Engineering-Design

Technical Review: _____ Date 5-22-00
Site Engineering-System Engineering

Technical Review: _____ Date 22 May 00
Plant Operations-Procedures

Technical Review: * _____ Date 5/17/00
Plant Maintenance

Technical Review: _____ Date 5-17-00
Plant Operations - Fire Protection

Submitted by: _____ Date 5/22/00
Fire Protection Supervisor

Concurrence: _____ Date 5/25/00
PORC Chairperson

PORC Meeting No.: 5957 Date 5/25/00

Plant Manager: _____ Date 5/25/00

* Confirmed Fire Ops is to perform tests on emergency lighting.
T. Cosby
5/17/00

REVISION LOG

Revision No.	DESCRIPTION OF REVISION	Date Approved
0	Initial Issue	8/23/96
1	Revision 1 to the Fire Protection Report (FPR) is a complete revision of the document. The previously issued change packages (FPR-01-1 thru -13) have all been incorporated and interfiled with this revision. These change packages have been approved by PORC independently. Besides minor editorial changes (e.g., correction of typographical errors, clarification of wording, etc.), the only new change to the FPR is to Part II, Section 14, in which the surveillance requirements (SR) for hose station inspections and valve position verification of valves in the Reactor Buildings have been revised. Also, a new SR has been added for valve actuation of hose station standpipe valves. All significant changes made by Revision 1 (e.g., change package revisions, the above mentioned surveillance requirements, etc.) are designated by revision bars.	11/19/98
2	Revision 2 to the FPR is to incorporate Fire Detection Zones 547 and 548 into Part II, Table 3.3-11. These zones are being added by DCN M-14226-A, which is installing automatic fire suppression and detection into the general area of Elevation 690.0, above the Boric Acid Tanks. Pages Changed: Coversheet, i, ii, iii, II-48 Pages Added: II-67 Pages Deleted: None Note: Sections with page(s) affected by this change are being included in their entirety and issued with this change package. Therefore, the entire sections will be issued as Rev. 2, with the specific changes denoted by revision bars.	12/17/98

REVISION LOG

Revision No.	DESCRIPTION OF REVISION	Date Approved
3	Revision 3 to the FPR affects Part VII and Part II, Sections 5.0 and 14.0. For continuity and consistency in pagination, the sections are being issued in their entirety as Rev. 3, with the actual changes denoted by revision bars. The changes to Part VII of the FPR were made as part of the corrective action plan for resolution of CAQ SQ962075PER. The PER was originally initiated due to a discrepancy between actual plant configuration and the justification for an NRC approved deviation to 10CFR50 Appendix R. The changes made in Rev. 3 of the FPR include resolution of documentation discrepancies involving combustible loading values, updates of cable rerouting, raceway barrier installations, procedure changes, etc. The nature of the discrepancies were all documentation only, and did not represent any unanalyzed configurations in the plant. Also, minor changes to existing evaluations in Part VII were done as enhancements. Changes to Part II of the FPR included the addition of the definition of "In-situ Combustible Loading," and the allowance for exceeding the compensatory measure time requirements, as specified by the Fire Operating Requirements (FORs), for fire suppression/detection equipment and fire barriers taken out of service during outages. The compensatory measures (i.e., backup fire suppression and/or fire watches) will remain in place until the equipment is placed back in service after the necessary outage-related work is completed.	2/11/99
4	Revision 4 to the FPR is in support of DCN D-20152. The change to the FPR involves deleting the discussion on the smoke detection in the ventilation intake ducts in the Main Control Room from Part VIII, pages 53 and 54. The DCN abandons the detectors in place, and disconnects the annunciation circuits to the MCR. Pages Changed: Coversheet, i, ii, iii, v, VIII-53, VIII-54 Pages Added: None Pages Deleted: None Note: Section VIII is being included in its entirety in the R4 change package, with the specific changes denoted by revision bars.	

REVISION LOG

Revision No.	DESCRIPTION OF REVISION	Date Approved
4	Minor format change to support electronic filing (Curator) conversion.	8/19/99
5	Revision 5 to the Fire Protection Report (FPR) was performed to incorporate the following changes: • Added Part II, Section 14.7 to incorporate new Fire Operating Requirement (FOR) 3.7.14 and Surveillance Requirement (SR) 4.7.14 for Emergency Battery Lighting (EBL) units, including compensatory actions and testing frequencies. Also revised Part V "Emergency Lighting and Reactor Coolant Pump Oil Collection" to address new FOR and SR; • Revised Part II, Section 14.5 (FOR/SR 3/4.7.11.4) for Fire Hose Stations to allow use of portable hose packs and removal of fire hoses from the hose stations inside the Reactor Buildings; • Clarified definitions for continuous and roving fire watches in Part II, Section 13.0; • Clarified compliance with NFPA-72D regarding exception to G-73 for bypassing the audible annunciation system in the Main Control Room (MCR), Panel 0-M-29, under the direct supervision of a dedicated operator at the console. • Revised Section 3.31 of Part VII to replace summary of superseded calculation MDQ0026-980017, "Fire Barrier Rating Evaluation for Hollow Block and Partially Filled 8" Concrete Block Walls" with calculation SCG1S591, "Fire Ratings of Hollow Core Masonry Walls." • Corrected minor documentation discrepancy in Part II, Table 3.3-11, in which the number of ionization fire detectors for Zone 230 was listed as 9, instead of the correct number of 10 detectors in the zone. • Revised Part II, Section 14.0 to reference Calculation SQN-SQS2-203, which addresses processes for restoring inoperable Appendix R equipment that is not currently bounded by existing Tech Specs to operable status. • Minor administrative change to Revision 4 Rev Log description to delete statement regarding MCR HVAC duct smoke detector abandonment in response to a recommendation from QA audit SSA0001. The recommendation was to remove the statement, "The duct detectors have been determined unnecessary based on the absence of industry in the vicinity that could be capable of producing significant enough smoke to affect the habitability in the MCR, and the detectors in the El. 732.0' Mechanical Equipment Room which will detect smoke entering the MCR ventilation system intake and subsequently alarm in the MCR," because it provided unnecessary detail that was not discussed in the FPR.	

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(All drawings will be current active version)

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LIST OF FIGURES

PART II - FIRE PROTECTION PLAN (Continued)

PART III - SAFE SHUTDOWN CAPABILITIES

PART X - FIRE HAZARDS ANALYSIS

1.0 PURPOSE AND SCOPE

Part II of the Sequoyah Nuclear Plant (SQN) Fire Protection Report describes the Fire Protection Plan (Plan) developed for SQN to ensure compliance with the requirements of 10 CFR 50.48 paragraphs (a) and (e), 10 CFR 50, Appendix R, Sections III.G, J, L, and O and the guidelines of Appendix A to Branch Technical Position (BTP) APCSB 9.5-1.

The Plan is applicable to Unit 1, Unit 2, and common areas needed for safe operation of SQN. Part II provides drawings for information only to more fully describe the Fire Protection Systems available. Compartmentation drawings are provided for information in Part X.

The latest drawings and associated change paper should be obtained when necessary. Fire protection features are described in the fire hazards analysis (refer to Part X).

2.0 OBJECTIVES OF THE FIRE PROTECTION PLAN

The Plan describes the controls associated with the SQN Fire Protection Program (FPP); identifies the organizations and positions that are responsible for the FPP; describes the authority of positions responsible for implementing the FPP; and outlines the plans for fire protection, fire detection and suppression capability, and limitation of fire damage. The Plan describes the features necessary to implement the FPP such as: administrative controls; personnel requirements for fire prevention and manual fire suppression activities; automatic and manually operated fire detection and suppression systems; and the means to limit fire damage to structures, systems, and components important to safety so that the capability to safely shutdown the plant is ensured.

The Plan describes the measures that are established at SQN to extend the concept of defense-in-depth to fire protection in areas important to safety. These measures are established:

- to prevent fires from starting,
- to rapidly detect, control, and promptly extinguish those fires that do occur, and
- to provide protection for systems important to safety so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the safe shutdown of the plant.

3.0 BASIS OF THE FIRE PROTECTION PLAN

The Plan at SQN has been developed to comply with and is based upon the requirements of General Design Criterion 3 in Appendix A to 10 CFR 50, 10 CFR 50.48, paragraphs (a) and (e), and TVA's commitment to implement Sections III.G, III.J, and III.O to 10 CFR 50, Appendix R and Appendix A to Branch Technical Position APCSB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976" (August 23, 1976). The requirements contained in Section III.L of Appendix R to 10 CFR 50 are also applicable to areas where alternate shutdown capability is selected. This Plan establishes the policy for and describes the manner in which TVA conforms with these requirements and the guidelines which have been promulgated to describe acceptable implementation methods. The applicable guidelines used as the basis for the Plan are listed in Section 4.1, Regulatory Documents.

4.0 REFERENCES

4.1 Regulatory Documents

4.1.1 Branch Technical Position (Auxiliary Power and Control Systems Branch) 9.5-1, Appendix A

4.1.2 10 CFR 50.48 - Fire Protection

4.1.3 10 CFR 50, Appendix A, Criterion 3 - "Fire Protection"

4.1.4 10 CFR 50 Appendix R - Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979

4.1.5 NRC letter dated August 29, 1977 - Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls and Quality Assurance

4.1.6 Generic Letter 81-12 - Fire Protection Rule and NRC Memorandum of Clarification for Generic Letter 81-12, dated March 22, 1982

4.1.7 Generic Letter 82-21 - Technical Specifications for Fire Protection Audits

4.1.8 Generic Letter 83-33 - NRC Positions on Certain Requirements of Appendix R to 10 CFR 50.

4.1.9 Generic Letter 86-10 - Implementation of Fire Protection Requirements

4.1.10 Generic Letter 86-10 - Supplement 1 - Fire Endurance Acceptance Criteria for Fire Barrier Systems Used to Separate Redundant Safe Shutdown Trains within the Same Fire Area

4.1.11 Generic Letter 88-12 - Removal of Fire Protection Requirements from Technical Specifications

4.1.12 Generic Letter 91-18 - Information to Licensees regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability.

4.1.13 NUREG-0452, Standard Technical Specifications for Westinghouse Pressurized Water Reactors, Revision 4 (referred to as standard Technical Specifications).

4.1.14 USNRC Regulatory Guide 1.75, "Physical Independence of Electric Systems"

4.2 TVA Documents

4.2.1 SQN Engineering Design Criteria, Drawings, Appendix R Key Calculations

4.2.2 NP-STD-12.15, "Fire Protection"

4.2.3 NP-STD-3.2, "Augmented Quality Assurance"

4.2.4 TVA-NQA-PLN89-A, "Nuclear Quality Assurance Plan"

4.2.5 General Engineering Specification G-73, "Installation, Modification, and Maintenance of Fire Protection Systems and Features"

4.2.6 General Engineering Specification G-96, "Installation, Modification, and Maintenance of Penetration Seals"

4.2.7 General Engineering Specification G-98, "Installation, Modification, and Maintenance of Electrical Raceway Fire Barrier Systems"

4.2.8 Mechanical Design Standard DS-M17.2.2, "Electrical Raceway Fire Barrier Systems"

4.2.9 System Description Document N2-302-400, "Penetration Seals" (formerly Engineering Report No. 0006-00902-01, "Penetration Seal Program Assessment Report").

4.2.10 TVA Calculation SQN-SQS2-203, "Evaluation of Fire Safe Shutdown Equipment for IE Notice 97-048."

4.3 Other Documents

4.3.1 ASTM E84 - Test for Surface Burning Characteristics of Building Materials

4.3.2 ASTM E119 - Fire Tests of Building Construction and Materials

4.3.3 ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops

4.3.4 Fire Protection Handbook, 14th Edition, National Fire Protection Association.

4.3.5 Fire Protection Handbook, 17th Edition, National Fire Protection Association.

4.3.6 Report of the Test of Internal Conduit Seals

4.3.7 Conduit Fire Protection Research Program (Wisconsin Test Report), 5/18/87

4.4 NFPA Codes and Standards

NOTE: Part VI of this Fire Protection Report documents the level of compliance with the NFPA codes and standards identified in Section 4.4. Other codes and standards referenced in Appendix A to BTP 9.5-1 are also addressed in Part VI. Deviations from code criteria that impact operational capability of the systems are documented in Part VII of the FPR.

4.4.1 NFPA 10-1975, "Portable Fire Extinguishers"

4.4.2 NFPA 12-1973, "Carbon Dioxide Extinguishing Systems"

4.4.3 NFPA 13-1975, "Installation of Sprinkler Systems"

4.4.4 NFPA 14-1974, "Standpipe and Hose Systems"

4.4.5 NFPA 15-1973, "Water Spray Fixed Systems for Fire Protection"

4.4.6 NFPA 20-1973, "Centrifugal Fire Pumps" for electric driven fire/flood mode pumps

4.4.7 NFPA 20-1993, "Centrifugal Fire Pumps", for dedicated UL/FM electric motor driven and diesel engine driven pumps.

4.4.8 NFPA 24-1973, "Outside Protection"

4.4.9 NFPA 30-1973, "Flammable and Combustible Liquids"

4.4.10 NFPA 72D-1975, "Proprietary Protective Signaling Systems"

4.4.11 NFPA 72E-1974, Automatic Fire Detectors"

4.4.12 NFPA 80-1981, "Fire Doors and Windows"

4.4.13 NFPA 90A-1975, "Air Conditioning and Ventilating Systems"

4.4.14 NFPA 194-1974, AFire Hose Connections "

4.4.15 NFPA 196-1974, AFire Hose "

4.4.16 NFPA 220-1985, "Types of Building Construction"

4.4.17 NFPA 251-1985, "Fire Tests of Building Materials"

5.0 DEFINITIONS

Action - ACTION shall be the part of a Specification which prescribes remedial measures required under designated conditions (FPR Preparer)

Approved - Tested and accepted for a specific purpose or application by a nationally recognized testing laboratory or acceptable to the authority having jurisdiction.
(FPR Preparer)

Authority Having Jurisdiction (AHJ) - The organization, office, or individual responsible for "approving" equipment, an installation, or a procedure. (For TVA nuclear power facilities, the Corporate Engineering Chief Engineer is the AHJ per NP STD 12.15 and serves as the central point of contact with other organizations) (NRC, Insurance Carrier). (G-73)

Automatic - Self-acting, operated by its own mechanism when actuated by some impersonal influence such as a change in current, pressure, temperature or mechanical configuration. (G-73)

Barrier - A feature of construction provided to separate or enclose various occupancies to create a boundary limit based on functional requirements, or a flexible material designed to withstand the penetration of water, vapor, grease, or harmful gases. (G-96)

Channel Functional Test - A CHANNEL FUNCTIONAL TEST shall be:

a. Analog channels - the injection of a simulated signal into the channel as close to the sensor as practicable to verify OPERABILITY including alarm and/or trip functions.

b. Bi-stable channels - the injection of a simulated signal into the sensor to verify OPERABILITY including alarm and/or trip functions.

c. Digital channels - the injection of a simulated signal into the channel as close to the sensor input to the process racks as practicable to verify OPERABILITY including alarm and/or trip functions. (FPR Preparer)

Combustible Material - Material which does not meet the definition of noncombustible. Any material which in the form in which it is used and under the conditions anticipated will ignite and burn (e.g., cable insulation, lube oil, plastic sheeting, charcoal, paper, etc.) (G-73)

Combustible Liquid - A liquid having a flash point at or above 100 °F (37.8 °C). (G-73)

Electrical Raceway Fire Barrier System (ERFBS)- A special type of Fire Barrier System designed to protect electrical raceways (e.g., conduits, cable trays, junction boxes, etc.) containing FSSD circuits required for Appendix R safe shutdown. (DS-M17.2.2)

Engineering - The organization responsible for the design basis of the plant. (G-73)

Fire Area (FA) - That portion of a building or plant that is separated from other areas by boundary fire barriers. (G-73) These FAs are defined on the compartmentation drawings and supported by the Fire Hazards Analysis. One room or several rooms may constitute a single fire area. A fire area may be

further subdivided by additional barriers. (FPR Preparer)

Note: For the purposes of fire watch compensatory actions, fire Areas have 3 hour rated fire barriers. Fire areas are further subdivided into 1.0- or 1.5-hour fire area and/or zones. These 1.0- or 1.5-hour compartments are analogous to the fire zones in earlier definitions and the Basis for Technical Specification 3.7.12. (FPR Preparer)

Fire Barrier - Those components of construction walls, floors, ceilings, and their supports including beams, joists, columns, penetration seals or closures, fire doors, and fire dampers that are rated by approving laboratories in hours of resistance to fire and are used to prevent the spread of fire. (G-73) ERFBS and radiant energy shields are also considered as fire barriers. Fire barriers that are not rated may be used when approved in accordance with a NRC Generic Letter 86-10 evaluation or equivalent. This definition does not include those barriers installed for RG 1.75 for less than 3' horizontal or 5' vertical separation of redundant cable trays. (FPR Preparer)

Fire Damper - A device, installed in the air distribution system, designed to close upon detection of heat or release as the result of a signal from a sensing device such as a CO_2 discharge signal or a smoke detector, to interrupt migratory air flow, and to restrict the passage of flame. A combination fire and smoke damper shall meet the requirements of both. (G-73)

Fire Detector - A device designed to automatically detect the presence of fire and initiate an alarm system and other appropriate action (see NFPA 72E, "Automatic Fire Detectors"). (G-73)

Fire Door - The door component of a fire door assembly. (G-73)

Fire Door Assembly - Any combination of a fire door, frame, hardware, and other accessories, that together provide a specific degree of fire protection to the opening. (G-73)

Fire Hazards Analysis (FHA) - An analysis performed by fire protection and systems engineers to consider potential in situ and transient fire hazards; determine the consequences of fire in any location in the plant on the ability to safely shutdown the reactor or on the ability to minimize and control the release of radioactivity to the environment and specify measures for fire prevention, fire detection, fire suppression and fire containment and alternative shutdown capabilities as required for each fire area containing structures, systems and components important to safety that are in conformance with NRC guidelines and regulations. The FHA demonstrates that the plant will maintain the ability to perform safe shutdown functions and minimize radioactive release to the environment in the event of a fire, and should verify that NRC FPP guidelines or equivalent level of protection have been met. (G-73)

Fire Loading - The amount of combustibles present in a given situation, expressed in BTUs per square foot. (G-73)

Fire Rated Assembly - A passive fire protection feature that is used to separate redundant fire safe shutdown capabilities. A fire rated assembly includes fire rated walls, floors, ceilings, ERFBSs, equipment hatches, stairwells, doors, dampers, and penetration seals. (FPR Preparer)

Fire Rated Penetration Seal - An opening in a fire barrier for the passage of pipe, cable, etc., which has been sealed so as not to reduce the integrity of the fire barrier.
(DS-M17.2.2)

Fire Resistance Rating - The time that materials or assemblies have withstood a fire exposure in accordance with the test procedures of NFPA 251, *Standard Methods of Fire Tests of Building Construction and Materials.* (G-73)

Fire Safe Shutdown (FSSD) Equipment - Structures, systems, or components required to shutdown the reactor and maintain it in a safe shutdown condition in the event of a fire. Structures, systems, and components used to satisfy fire safe shutdown requirement commitments do not have to be safety-related. (FPR Preparer)

Fire Severity - A unit of measure, in terms of time (hours or minutes) that is used to quantify the hazards associated with the fire loading in a given plant area. It is based on an approximate relationship between fire loading and exposure to a fire severity equivalent to the standard time-temperature curve, as defined by ASTM E-119. The fire loading of ordinary combustibles such as wood, paper, and similar materials with a heat of combustion of 7000 to 8000 Btu per lb. is related to hourly fire severity. It should not be used with combustibles having a high heat-release rate. The following Fire Severity Index is used to qualify the hazards associated with the combustible loading and was developed based on information from Section 6 / Chapter 6, 17 edition of the Fire Protection Handbook. (FPR Preparer)

FIRE SEVERITY INDEX	COMBUSTIBLE LOADING	EQUIVALENT FIRE SEVERITY
Insignificant	< 6,500 BTU/sq. ft.	< 5 minutes
Low	< 80,000 BTU/sq. ft.	< 60 minutes
Moderate	< 160, 000 BTU/sq. ft.	< 120 minutes
Moderately Severe	< 240,000 BTU/sq. ft.	< 180 minutes
Severe	> 240,000 BTU/sq. ft.	> 180 minutes

Fire Suppression - Control and extinguishing of fires. Manual fire suppression is the use of hoses, portable extinguishers, or manually-actuated fixed systems by plant personnel. Automatic fire suppression is the use of automatically actuated fixed systems such as water, Halon, or carbon dioxide systems. (G-73)

Fire Wall - A wall having adequate fire resistance and structural stability under fire conditions to accomplish the purpose of subdividing buildings to restrict the spread of fire. (DS-M.17.2.2)

Fire Watch - A fire watch is a compensatory action used when fire protection systems or features are inoperable or impaired as required by Operating Requirements (ORs). Additionally, fire watches may be utilized for compensatory actions when limits are exceeded in administrative controls for areas (e.g., excessive transient fire loads).
(FPR Preparer)

Fire Watch-Hourly - Hourly fire watch patrols require that a trained individual be in the specified area at intervals of 60 minutes with a margin of 15 minutes. (FPR Preparer)

Fire Watch-Continuous - A continuous fire watch requires that a trained individual be in the specified area at all times, that the specified area contain no impediment to restrict the movements of the continuous fire watch, and that each compartment within the specified area is patrolled at least once every 15 minutes with a margin of 5 minutes. A specified area for a continuous fire watch is one or more fire

zones within a single fire area, which are easily accessible to each other and can be patrolled within 15 minutes. Easy access is defined as: no locked doors or inoperable card reader, no C-Zone entry required, or no hazards that will interfere with the continuous fire watch activity being performed within the 15-minute period. (FPR Preparer)

Fire (Protection) Water Distribution System - The piping and appurtenances on TVA property between a source of fire protection water and the base of the riser (flange of flange and spigot piece or base tee) for automatic sprinkler systems, fixed water spray systems, standpipe systems, and other water based fire suppression systems. (G-73)

Flammable Liquid - A liquid having a flash point below 100°F and having a vapor pressure not exceeding 40 lbs/in^2 (absolute) at 100°F shall be known as a Class I Liquid.
(G-73)

Frequency - Each Surveillance Requirement (SR) has a specified Frequency in which the SR must be met in order to meet the associated Operating Requirement (OR). The "specified frequency" is referred to in Section 14. (FPR Preparer)

Functional Test - The injection of a simulated signal into the sensor or device to verify the operability, including alarm and/or activation functions. (FPR Preparer)

Inaccessible Area - Those areas defined by the FSAR Chapter 12.1 as a High Radiation Area or a Very High Radiation Area. Areas may be designated as inaccessible by the Fire Protection Manager because operating conditions that pose immediate danger to life and health from environmental or operational conditions. (FPR Preparer)

In-Situ Combustible Loads - Combustible material permanently located in a room or fire area. The total amount of in-situ combustibles in a fire area is used to determine the fire severity rating. The combustible loading values and fire severity ratings are included in the Fire Hazards Analysis. (FPR Preparer).

Internal Conduit Seals

a. Smoke and Hot Gas Seals - Noncombustible seals installed inside conduit openings to prevent the passage of smoke and hot gasses through fire barriers. These seals may be located at the fire barrier or at the nearest conduit entry on both sides of the fire barrier. Smoke and hot gas seals are not required to have a fire resistance rating equal to the fire barrier they are installed in. (G-96)

b. Heat and Fire Seals - Fire rated seals installed inside conduits at or in close proximity to the fire barrier. Heat and fire seals have the same or greater fire resistance rating as the fire barrier they are installed in. (G-96)

Labeled - Equipment or materials to which has been attached a label, symbol or other identifying mark of an organization acceptable to the authorities having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner. (G-73)

Limited Combustible Material - As applied to a building construction material, a material not complying with the definition of noncombustible material, which, in the form in which it is used, has a potential heat value not exceeding 3500 Btu per lb. (8141 kJ/Kg), and complies with one of the following paragraphs (a) or (b). Materials subject to increase in combustibility or flame spread rating beyond the limits herein established through the effects of age, moisture, or other atmospheric condition shall be considered combustible.

(a) Materials having a structural base of noncombustible material, with a surfacing not exceeding a thickness of 1/8 in. (3.2mm) which has a flame spread rating not greater than 50.

(b) Materials, in the form and thickness used, other than as described in (a), having neither a flame spread rating greater than 25 nor evidence of continued progressive combustion and of such composition that surfaces that would be exposed by cutting through the material on any plane would have neither a flame spread rating greater than 25 nor evidence of continued progressive combustion. (NFPA 220)

Listed - Equipment or materials included in a list published by an organization acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner. (G-73)

Noncombustible Material - 1) A material which in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat; having a structural base of noncombustible material, as defined above, with a surfacing not over 1/8-inch thick that has a flame spread rating not higher than 50 when measured using ASTM E84 Test, "Surface Burning Characteristics of Building Materials". (G-73) 2) A material which, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors, when subjected to fire or heat.

Materials which are reported as passing ASTM E136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C, shall be considered noncombustible materials. (NFPA 220)

Operable-Operability - A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s), and when all necessary attendant instrumentation, controls, a normal and an emergency electrical power source, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component or device to perform its function(s) are also capable of performing their related support function(s). (FPR Preparer)

Operational Mode - Mode - An OPERATIONAL MODE (i.e., MODE) shall correspond to any one inclusive combination of core reactivity condition, power level and average reactor coolant temperature specified in Table 5.1. (FPR Preparer)

Operating Requirement (OR) - The lowest level functional capabilities or performance levels of equipment required to ensure adequate fire protection capability is established and maintained to protect safety-related and FSSD equipment from the effects of fire. When an OR is not met, action statements are provided to describe remedial action until the OR can be met. (FPR Preparer)

Penetration - An opening through structural members or barriers such as walls, floors, or ceilings for passage of penetrating components. (G-96)

Penetration Seal - Materials, devices, or assemblies installed in communicating spaces across barriers, which provide effective sealing against defined environmental exposure criteria to achieve the same functional requirement as that originally intended by the structural member or the barrier. (G-96)

Portable Fire Extinguisher - A portable device containing powder, liquid, or gases which can be expelled under pressure for the purpose of suppressing or extinguishing a fire.
(FPR Preparer)

Pre-action Sprinkler System - A system employing automatic sprinklers attached to a piping system connected to a water supply containing air that may or may not be under pressure, with a supplemental fire detection system installed in the same area as the sprinklers. Actuation of the fire detection system (as from a fire) opens a valve that permits water to flow into the sprinkler piping system and to be discharged from any sprinklers that may be open. (G-73)

Primary Containment - A structure that acts as a barrier to the release of radioactive fission products or other radioactive substances. Primary containment is a gas-tight shell that receives and contains the water, steam, and fission products that flow from any break in the reactor coolant pressure boundary located within primary containment. (FPR Preparer)

Safety-Related - Items that meet the following criteria:

a. Those functions that are necessary to ensure:

(1) The integrity of the reactor coolant pressure boundary.
(2) The capability to shut down the reactor and maintain it in a safe condition.
(3) The capability to prevent or mitigate the consequences of an incident which could result in potential offsite exposures comparable to those specified in 10 CFR 100.
(G-73)

Safety-Related Area - Any area containing safety-related equipment. Safety-related areas include: Unit 1 Reactor Building, Unit 2 Reactor Building, Auxiliary Building (including Unit 1 & 2 Additional Equipment Buildings) , Control Building, Intake Pumping Station, Essential Raw Cooling Water Pump Station, Diesel Generator Building, cable/conduit duct banks between safety-related buildings, and portions of the Yard containing safety-related equipment. (FPR Preparer)

Secondary Containment - The structures (annulus and auxiliary building) that provides a plenum for the temporary, low pressure retention of gaseous leakage from primary containment. (FPR Preparer)

Smoke Detector - A device which detects the visible or invisible particles of incomplete combustion. (G-73)

Sprinkler System - A network of piping connected to a reliable water supply that will distribute the water throughout the area protected and will discharge the water through sprinklers in sufficient quantity either to extinguish the fire entirely or to prevent its spread. The system, usually activated by heat, includes a controlling valve and a device for actuating an alarm when the system is in operation. Specific systems are manually actuated and do not contain a device for actuating an alarm when the system is in operation.
(FPR Preparer)

Staggered Test Basis - A STAGGERED TEST BASIS shall consist of:

a. A schedule for n systems, subsystems, trains or other designated components obtained by dividing the specified test interval into n equal subintervals,

b. The testing of one system, subsystem, train or other designated component at the beginning of each subinterval. (FPR Preparer)

Standpipe and Hose System - An arrangement of piping, valves, hose connections, and allied equipment installed in a building with the hose connections located in a manner that the water can be discharged in streams or spray patterns through attached hose and nozzles, for the purpose of extinguishing a fire and so protecting a building and its contents in addition to protecting its occupants. This is accomplished by connections to water supply systems or by pumps, tanks and other equipment necessary to provide an adequate supply of water to the hose connections. (G-73)

Testable Valves - Refers to valves such as Outside Screw and Yoke (OS&Y), butterfly, and gate, (with or without automatic operators) that are designed to be cycled or exercised to ensure operation and prevent binding. This does not refer to valves such as check valves, solenoid valves, alarm test valves, or suppression system water flow alarm valves. (FPR Preparer)

Thermal Detector - A device that detects abnormally high temperature or rate of temperature rise. (FPR Preparer)

Transient Fire Loads - Any combustible material that is not permanently present in a given area, and may be introduced during maintenance, repair, rework, or may be transported to a final destination for permanent installation or maintenance, repair, rework of equipment systems and components present there. (G-73)

Water Spray Nozzle - A normally open water discharge device which, when supplied with water under pressure, will distribute the water in a special, directional pattern peculiar to the particular device. (G-73)

Water Spray System - A special fixed piping system connected to a reliable source of fire protection water supply and, equipped with water spray nozzles for specific water discharge and distribution connected to the water supply through an automatically or manually actuated valve which initiates the flow of water. An automatic valve is actuated by operation of automatic detection equipment installed in the same areas as the water spray nozzles (in special cases the automatic detection equipment may also be located in another area). (G-73)

Water Supply - An arrangement of pumps, piping, valves, and associated equipment necessary to provide an adequate, reliable supply of water for the extinguishment of fires.
(FPR Preparer)

TABLE 5.1

OPERATIONAL MODES

MODE	REACTIVITY CONDITION, K_{eff}	% RATED THERMAL POWER*	AVERAGE COOLANT TEMPERATURE
1. POWER OPERATION	≥0.99	>5%	≥350°F
2. STARTUP	≥0.99	≤5%	≥350°F
3. HOT STANDBY	<0.99	0	≥350°F
4. HOT SHUTDOWN	<0.99	0	350°F>T_{avg}>200°F
5. COLD SHUTDOWN	<0.99	0	≤200°F
6. REFUELING**	≤0.95	0	≤140°F

* Excluding decay heat.

** Fuel in the reactor vessel with the vessel head closure bolts less than fully tensioned or with the head removed

6.0 FIRE PROTECTION QUALITY ASSURANCE

TVA has developed an augmented Quality Assurance (QA) Program for fire protection which satisfies the guidelines for QA for Fire Protection established by Appendix A to Branch Technical Position APCSB 9.5-1 and the Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls, and Quality Assurance letter (dated August 29, 1977) for fire protection features that provide protection for safety-related structures, systems or components and fire safe shutdown systems. Refer to Part VIII of the FPR for a comparison of the SQN Fire Protection Program with Appendix A guidelines.

The QA program for fire protection uses the applicable parts of the TVA Nuclear Quality Assurance Plan (TVA-NQA-PLN89-A). More stringent QA requirements may apply to fire protection features that also perform nuclear safety-related functions such as containment isolation. This QA program is described in corporate Standards and implemented in SQN procedures.

7.0 FIRE PROTECTION ORGANIZATION/PROGRAMS

7.1 TVA Nuclear (TVAN) Corporate Management

The Senior Vice President, Nuclear Operations, TVAN, his/her equivalent or designee, has the overall responsibility for establishing policies and programs related to fire protection. The General Manager, Operations Services, his/her equivalent or designee, establishes fire protection programs and fire brigade training and qualification requirements and assesses their effectiveness. Agreements are maintained between the TVAN and TVA Fossil and Hydro Power organizations for providing training and qualification of fire brigade and Incident Commander personnel. The Senior Vice President, Nuclear Operations, TVAN, assumes or delegates the responsibility for "Authority Having Jurisdiction" (AHJ) for Operational fire protection matters.

The Vice President, Engineering and Technical Services, TVAN, has the overall responsibility for establishing the design basis of the plant systems and features related to fire protection. The Corporate Engineering Chief Engineer assumes or delegates the responsibility as the "Authority Having Jurisdiction" (AHJ) for the design basis fire protection matters.

TVAN has on staff or as a consultant, an individual(s) who meet the eligibility requirements as a Member Grade in the Society of Fire Protection Engineers.

7.2 Site Vice President (VP)

The Site VP is responsible for the development, implementation, and administration of the Fire Protection Program. Authority and accountability for overview and implementation of the program have been further delegated to the Plant Manager. Specific requirements and responsibilities related to tasks such as administrative control of fire hazards, manual fire suppression, and maintenance of fire protection equipment have been delegated to various site organizations. The Site VP also provides design, engineering, and construction resources for fire protection systems and features.

7.3 Plant Manager

The Plant Manager is responsible for management oversight of the development and implementation of the SQN Fire Protection Plan.

7.4 Operations Manager

The Operations Manager is responsible for the development, implementation, and control of the SQN Fire Protection Plan. The Operations Manager provides senior management assistance and departmental interface for the resolution of fire protection-related issues referred by the Fire Protection Manager.

7.5 Fire Protection Manager

The Fire Protection Manager has overall responsibility for SQN fire protection program and related activities at the site. The Fire Protection Manager has available an individual who meets the eligibility requirements as a "member grade" in the Society of Fire Protection Engineers to support the fire protection administrative program.

Fire Protection Engineers are provided, for fire protection systems and features, to provide technical

leadership to plant personnel for assigned fire protection systems and features, proactive identification and resolution of technical issues affecting fire protection systems and features, initiation of fire protection-related design modifications, and technical assistance to fire protection management, operations, and maintenance organizations.

The Fire Protection Manager has the following responsibilities:

a. Ensures that the assigned sections of the Fire Protection Report are maintained.

b. Provides oversight to the Appendix R fire protection program.

c. Represents SQN management concerning site fire protection-related issues with regulators, insurance representative, state and local authorities, and other outside agencies such as the local fire department.

d. Ensures that fire protection systems and features are tested, inspected, and maintained in accordance with provisions set forth in this Plan.

e. Supervises SQN's fire protection emergency response organization.

f. Ensures appropriate modification (design changes) and other complex work packages are evaluated for compliance with established fire protection codes and standards and regulatory commitments.

g. Ensures the overall readiness of the fire protection organization and site personnel, to combat, suppress, and report fires, perform tests, and provide technical programmatic oversight.

h. Ensures that pre-fire plans and procedures for fire emergencies are maintained.

i. Ensures periodic fire protection inspections are performed as required.

j. Administers the process that controls fire protection systems and feature impairments and restorations, and associated compensatory actions to ensure compliance with regulatory requirements.

k. Develops and implements administrative and physical controls of transient combustibles and ignition sources.

l. Ensures that work initiating documents (WID) are reviewed for impact on the elements of the Fire Protection Plan.

m. Provides advice and assistance to plant personnel on fire protection matters.

n. Ensures the fire protection system/equipment surveillance and maintenance program and its associated instructions are developed and maintained.

o. Ensures fire protection system test and surveillance results are evaluated for determination of operability status and deficiencies are correctly dispositioned.

p. Establishes and implements the periodic site training and drill requirements as outlined in this plan.

q. Ensures that fires are investigated.

r. Ensures the implementation of the augmented Quality Assurance Program for Fire Protection.

s. Ensures adequate staff and fire fighting equipment are available on site for the onsite emergency response organization.

7.6 Nuclear Engineering

The Engineering & Materials Manager is responsible for fire protection related design activities at the site. Nuclear Engineering has available an individual who meets the eligibility requirements as a "Member Grade" in the Society of Fire Protection Engineers to assist in fire protection design. Nuclear Engineering:

a. Maintains responsibility for the technical adequacy of the SQN Fire Protection Report.

b. Reviews and evaluates applicability of regulations and standards to fire protection system design activities.

c. Reviews the design, installation and modification of plant fire protection equipment and systems for conformance to regulatory requirements, general industry fire protection standards, and soliciting and integrating operational considerations into these documents.

d. Provides technical advice and assistance to plant personnel on fire protection engineering design activities.

e. Reviews design activities for impacts on Appendix R Safe Shutdown and the Fire Hazards Analysis.

f. Establishes design bases for fire suppression, fire barrier, fire detection, and alarm system.

g. Ensures the technical adequacy of permanent fire protection features installed in nuclear power plants.

h. Ensures that plant and system design considers the safety to life from fire in buildings and structures.

I. Coordinates the development of positions to generic fire protection-related engineering issues and provides support in the development of positions to site-specific licensing and insurance issues.

j. Participates in fire protection presentations, submittals, and commitments made to the NRC that involve engineering.

7.7 Nuclear Assurance

Nuclear Assurance ensures annual, biennial, and triennial audits are performed in accordance with the SQN Fire Protection Plan, Section 8.3.

7.8 Site Personnel

The SQN Fire Protection Plan applies to Nuclear Generation employees and contractors performing activities at SQN.

Site personnel who have duties or perform work activities at SQN are responsible for being familiar with procedures applicable to them during a fire emergency and conducting day-to-day work activities in accordance with plant fire protection administrative procedures.

General employee's fire protection-related responsibilities and requirements are provided in the plant access training program. As part of their instruction, Employees are familiarized in the following areas of fire protection:

1) Fire Protection transient combustibles and hazard identification.
2) Fire Detection and the proper procedure to report a fire in the plant.
3) Fire extinguishing systems installed in the plant.
4) Compartmentation and its importance to fire protection.

Employees are instructed in the proper procedure for reporting a fire emergency. Employees are not trained or required to combat fires. Manual fire suppression is performed by personnel specifically trained in fire suppression (i.e., Fire Brigade).

8.0 FIRE PROTECTION PROGRAM ADMINISTRATIVE AND TECHNICAL CONTROLS

This section of the SQN Plan provides the administrative process and controls for implementation of the Fire Protection Program.

8.1 Program Changes and Associated Review and Approval

a. Nuclear Engineering is responsible for the technical accuracy of the SQN Fire Protection Report (FPR). Changes to the FPR are initiated similar to the UFSAR change process and require a 10CFR50.59 review.

b. The Fire Protection Manager reviews proposed changes to the Fire Protection Report and fire protection administrative procedures to ensure adequacy and compliance with established regulatory commitments.

c. The Plant Operations Review Committee (PORC) reviews changes to the Fire Protection Report (excluding the figures in the FPR that are issued design drawings and Part X, *Fire Hazards Analysis*, which is controlled in accordance with NEP-3.1, *Calculations*) and SSP-12.15, Fire Protection.

d. The Nuclear Safety Review Board (NSRB) functions to provide for independent review and audit activities in the area of the site Fire Protection Program.

e. SQN may make changes to the approved Fire Protection Report without prior approval of the NRC only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

e. The Fire Protection Report is updated in accordance with 10CFR50.71.

8.2 Modification Control

A fire protection evaluation is performed (when required) for plant modifications in accordance with established Nuclear Engineering procedures. This evaluation is performed to ensure that adequate fire protection measures are maintained, combustible loading considerations are addressed, the overall Fire Protection Program is not degraded, and requirements and guidelines of regulatory agencies have been considered. The evaluation also addresses specific commitments to the applicable sections of 10CFR50, Appendix R.

8.3 Audits/Inspections of the Fire Protection Program

In accordance with Generic Letter No. 82-21, "Technical Specifications for Fire Protection Audits" the following system of audits are conducted to assess the SQN fire protection equipment and FPP implementation to verify continued compliance with NRC requirements and TVA commitments:

a. An annual fire protection and loss prevention inspection and audit utilizing either qualified offsite TVA personnel or an outside fire protection firm,

b. A biennial audit of the FPP and implementing procedures, and

c. A triennial fire protection and loss prevention inspection and audit utilizing an outside qualified fire protection consultant.

8.4 Assessment of Information Notices, Generic Letters, Bulletins, etc.

The Sequoyah Nuclear Experience Review (NER) Program and Licensing Staff ensures that NRC Information Notices, Generic Letters, Bulletins, and other relevant documents that provide information on generic or specific fire protection and/or fire safe shutdown issues are assessed for applicability to SQN. The responsible organizations (i.e., licensing, engineering, operations, etc.) for addressing the applicable issues are determined upon assessment of the subjects identified in the documents.

8.5 Nonconformance and Reportability

Nonconformance with the requirements described in Section 14.0 shall be evaluated for reportability and corrective actions performed in accordance with site administrative procedures. Nonconformance occurs when the limits of the Surveillance Requirements (SR) (including allowable extensions) are exceeded or conditions of the associated action statement are not met.

9.0 EMERGENCY RESPONSE

9.1 Fire Brigade Staffing

Effective handling of fire emergencies is an important aspect of the SQN Fire Protection Program. This is accomplished by trained and qualified emergency response personnel. The fire response organization is staffed and equipped for fire fighting activities. The fire brigade is comprised of a fire brigade leader and four fire brigade members.

A fire brigade of at least 5 members shall be maintained onsite at all times. The fire brigade shall not include the Shift Manager and 2 other members of the minimum shift crew necessary for safe shutdown of the unit or any personnel required for other essential functions during a fire emergency. Additional support is available when needed through an agreement with a local fire department.

An Incident Commander is available to direct each shift fire brigade. The Incident Commander is an Unit Supervisor (or equivalent) and has sufficient training in or knowledge of plant safety-related systems to understand the effects of fire and fire suppressants on safe shutdown capability.

The fire brigade composition may be less than the minimum requirements for a period of time not to exceed two hours, in order to accommodate unexpected absence, provided immediate action is taken to fill the required positions. A life-threatening medical emergency, requiring the plant ambulance and EMT responders to leave the site for transport of the patient, is an example of an emergency that would prevent the full fire brigade from being available onsite. This is expected to be a rare occurrence.

9.2 Fire Brigade Support Personnel

a. Site Nuclear Security provides access to the security controlled area for the fire brigade and offsite fire response personnel during fire emergencies. This includes traffic, emergency vehicle, and crowd control, when necessary.

b. Site Radiological Control (RADCON) personnel provide radiological support for the fire brigade to advise the brigade on radiological hazards and assist in radiological decontamination efforts if necessary. RADCON personnel provide radiological support for offsite fire response personnel.

9.3 Training and Qualifications

SQN fire brigade training ensures that the fire brigade's capability to combat fires is established and maintained. Prior to training and annually thereafter, each fire brigade member and leader receives a medical evaluation to ensure the ability to perform strenuous physical activity, to wear special respiratory equipment, and for unescorted access to nuclear plants.

The training program consists of initial (classroom and practical) training and recurrent training which includes periodic instruction, fire drills and annual fire brigade training.

a. Initial training

Initial training consists of classroom instruction and practical exercises to include actual

fire extinguishment and use of fire fighting and related equipment under strenuous fire fighting conditions. Training includes:

1) Identification of the fire hazards and associated types of fires that could occur in the plant and an identification of the location of such hazards.

2) Identification of the location of fire fighting equipment for each fire area, and familiarization with layout of the plant including access and egress routes to each area.

3) The proper use of available fire fighting equipment, and the correct method of fighting each type of fire. The types of fires covered include electrical fires, fires in cables and cable trays, hydrogen fires, flammable liquid fires, waste/debris fires, and record file fires.

4) Indoctrination of the plant fire fighting plan with specific coverage of each individual's responsibilities.

5) The proper use of communication, lighting, ventilation, and emergency breathing apparatus.

6) The toxic characteristics of expected products of combustion.

7) The proper methods for fighting fires inside buildings and tunnels.

8) Detailed review of Pre-Fire Plans and procedure changes.

9) Review of latest plant modifications and changes in fire fighting plans.

10) The direction and coordination of the fire fighting activities (fire brigade leaders only).

In addition, fire brigade leaders receive additional training that provides the fire brigade leader with the knowledge and skills necessary to supervise and direct the activities of the fire brigade during an incident.

b. Recurrent training

Training and qualification will be scheduled with a maximum allowed extension of 25 percent of the listed frequency interval.

1) Periodic Classroom Instruction

Regular planned meetings will be held every three months. These planned meetings will repeat the initial training subject matter over a two-year period.

2) Fire Drills

Drills are pre-planned to establish the objectives and are conducted by the fire training instructor or designated representative. Drills are conducted as follows:

a) A minimum of one drill per shift every 92 days.

b) A minimum of one unannounced drill per shift per year.

c) At least one drill per shift per year is performed on a "backshift" for each fire brigade.

d) At three-year intervals, a randomly selected, unannounced drill critiqued by qualified individuals performing a triennial audit of the fire protection plan.

e) An annual fire drill, which includes participation by the offsite fire department organization(s) that has an active agreement(s) to provide fire fighting and equipment response to the plant.

f) Fire brigade members including leaders shall participate in at least two drills per year.

g) When assigned as the shift Incident Commander, the Incident Commander shall attend all fire drills occurring during that shift.

Performance deficiencies of the fire brigade or individual brigade members are remedied by scheduling additional training.

3) Annual Fire Brigade Training

Annual Fire Brigade Training will be held for the fire brigade on the proper method of fighting various types of fires similar in magnitude, complexity, and difficulty as those that could occur. This training will include actual fire extinguishment and the use of emergency breathing apparatus under strenuous conditions.

Annual briefings are provided to the local fire departments to assure their continued understanding of their role in the event of a fire emergency at the plant. The annual briefings are required for only those local fire departments that have aid agreements with the plant.

9.4 Fire fighting Equipment

Fire fighting equipment is provided throughout the plant. The availability of fire fighting equipment is such that delays in obtaining equipment by the fire brigade for fire emergencies will be minimized.

Fire fighting equipment may, alternatively, be staged adjacent to or at the access to areas/locations to facilitate equipment availability.

Examples of the types of fire fighting equipment available are as follows:

- mobile apparatus
- portable ventilation equipment
- fire extinguishers
- self-contained breathing apparatus and reserve air bottles
- fire hose
- nozzles, gated wyes, fittings, and foam applicators
- personal protective equipment such as turn-out coats, boots, gloves, and helmets
- communication equipment
- portable lights
- ladders for fire fighting use

9.5 Fire Emergency Procedures and Pre-fire Plans

Fire emergency procedures and pre-fire plans specify actions taken by the individual discovering a fire and actions considered by the emergency response organization. Included in these procedures are operational instructions for response to the fire detection system annunciation. These procedures provide different levels of response based on the type of alarms received. An annunciation may or may not carry the same level of response as the report of a fire by site personnel.

Pre-fire plans are developed to support fire fighting activities in safety-related areas, in fire safe shutdown system areas, and areas which may present a hazard to safety-related or FSSD equipment. Pre-fire plans are not intended to establish a procedure or step-by-step process but to provide guidance, depending upon the particular circumstances, to aid in fire fighting efforts. It is recognized that many different fire fighting techniques or strategies exist which would be acceptable for fire suppression efforts.

The pre-fire plans include the following information, as appropriate:

N Identification of plant equipment
N Access and egress routes for fire areas
N Fire fighting strategy and tactics
N Location of fire protection features
N Identification of special fire, toxic material, and radiological hazards
N Special consideration of hazards
N Ventilation methodology

Safe shutdown procedures are available in the event a fire occurs in safety-related or FSSD equipment areas of the plant.

10.0 CONTROL OF COMBUSTIBLES

Combustibles are controlled to reduce the severity of a fire which might occur in a given area and to minimize the amount and type of material available for combustion.

The use and application of combustible materials at SQN are controlled utilizing the following methods:

- Instructions/guidelines provided during general employee training/orientation programs.
- The chemical traffic control program.
- Periodic plant housekeeping inspections/tours by management and/or the plant fire protection organization.
- Design/modification review and installation process.
- Administrative procedures.

The fire protection organization performs a periodic fire safety inspection of the safety-related areas of the plant to identify and minimize potential fire hazards.

The use and handling of combustible materials such as fire retardant-treated lumber, paper, plastic, and flammable/combustible gases and liquids are controlled in safety-related areas. The use of untreated lumber in safety-related areas requires specific approval of the fire protection organization.

Combustible materials (e.g., combustible packing materials, flammable and combustible liquids) necessary for maintenance work activities are properly stored at the conclusion of the work activity, unless alternative conditions are implemented in accordance with administrative procedures.

The control of hazardous waste and hazardous materials is conducted in accordance with the chemical control and hazardous material processes. Materials containing or collecting significant radioactivity are stored in closed metal containers in the radwaste area.

Design considerations in the control of combustibles is utilized when appropriate. For example, these considerations include the application of noncombustible or limited combustible construction materials or components, use of noncombustible fluids in operating equipment, dikes, or containments provided for equipment containing combustible liquids, etc.

11.0 CONTROL OF IGNITION SOURCES

The use of ignition sources such as welding, flame cutting, thermite welding, brazing, grinding, arc gouging, torch applied roofing, and open flame soldering within safety-related areas are controlled through the approval and issuance of an ignition source permit.

Fire watch systems are established for all ignition source work activities that are performed in safety-related areas.

12.0 DESCRIPTION OF FIRE PROTECTION SYSTEMS AND FEATURES

Fire protection systems and related features consist of the following subsystems:

- water supply
- standpipes, hoses and hydrants
- automatic and manual fire suppression equipment
- fire detection
- lightning protection, emergency lighting, and communications
- reactor coolant pump lube oil collection system, and
- fire-rated assemblies

The following subsections are summary discussions of these fire protection systems and related features.

12.1 Water Supply

The High Pressure Fire Protection (HPFP) system water supply is common to both units and consists of one electric motor driven fire pump and one diesel engine driven fire pump. Each pump takes suction from its own 300,000 gallon potable water storage tank which is supplied by the local municipal utility. The pump supply piping is interconnected such that either or both pumps can take suction from either tank. The electric pump is the lead pump and the diesel pump is a 100% backup. Each pump is capable of supplying the water required for all Appendix R fires and most general plant fires. The pumps are located in the HPFP pump house in their own room separated by a 3 hour fire wall. Each pump is connected to the HPFP system looped yard main by a separate supply line which can be isolated.

The fire pumps automatically start on low HPFP system header pressure. The HPFP system is normally pressurized when the fire pumps are not running by a cross connect to the fire tank potable water supply and two jockey pumps which automatically start if the potable water supply cannot maintain system header pressure. The cross connect is downstream of the potable water backflow preventer and contains a pressure regulator and check valve to isolate the fire protection system from a failure of the potable water supply and prevent recirculation back to the fire tanks during fire pump operation. If the HPFP header pressure drops below the fire pump start pressure for approximately 1 to 3 seconds the electric fire pump will start. If the pressure remains below the fire pump start pressure for approximately 8 to 10 seconds the diesel fire pump will start. The fire pumps can be manually started locally or from the main control room but can only be shut off from the local control panel.

The electric fire pump is powered from the 6900VAC Yard Area Common Board. The diesel fire pump and instrumentation is powered by a battery system and will operate on a loss of AC power. The electric fire pump has control room alarms which indicate pump motor running, loss of line power, phase reversal, and motor failed to start. The diesel fire pump has control room alarms which indicate engine running, engine failed to start, and controller not in automatic start position. Each pump also has a common alarm in the control room for adverse environmental conditions and equipment failures effecting pump operation.

The HPFP system is also connected to the two fire/flood mode pumps (old fire pumps) which can be utilized by opening the normally closed valves which isolate them from the system. These are electric pumps which take suction from the forebay and are powered from separate (Class 1E) 480 VAC shutdown boards. These pumps are not required for the HPFP system to fulfill its design bases.

Strainers are provided at the IPS and inside the AB on the fire pump headers. These strainers were

installed because the original system was supplied by river water. The strainer at the IPS is normally bypassed unless a fire/flood mode pump is being used to supply river water to the HPFP system.

In addition, fire protection water strainers are located in the flow path just upstream of the flow control valves for the various sprinkler and water spray systems supplying safety-related areas. The fire pump strainers and the flow path strainers are inspected and maintained in accordance with the SQN Periodic Inspection Program. A fire protection water distribution system is provided to serve both units. Sectional isolation valves are provided so that maintenance may be performed on portions of the loop while maintaining fire fighting capability.

The sectional isolation valves in the underground loop are locked or sealed in position and surveillance is performed to ensure proper system alignment. The fire protection water distribution system is cross-tied between units.

12.2 Standpipes, Hose Stations , and Hydrants

Interior manual hose installations are provided throughout the plant typically as back up for the automatic suppression systems and, in some cases, as the primary suppression system.

Selected hazards in the Reactor Buildings have automatic suppression systems as primary protection. These hazards include closed head, pre-action water spray systems installed for each reactor coolant pump (RCP) and pre-action sprinklers in the annulus that serve as water spray on select cable concentrations and to prevent specific cable interactions. These automatic suppression systems are the primary suppression for these hazards with the standpipes as the backup.

For lower containment areas of the Reactor Buildings, the primary suppression system is the Reactor Building standpipes with the Auxiliary Building standpipes serving as the backup system. Upper containment areas utilize auxiliary building hose stations.

The standpipe systems in the IPS serve as the primary system, with yard hydrants and mobile apparatus providing the backup system. Hydrants are appropriately located throughout the yard in the vicinity of the IPS.

The ERCW Pumping Station is provided with two independent standpipe systems (supplied by train A and Train B ERCW Pumps).

Selected areas in the Diesel Generator Building (DGB) have automatic CO_2 and pre-action sprinkler systems as primary protection with the standpipe system serving as the backup system in these areas. In areas of the DGB without automatic suppression, the standpipe system serves as the primary system, with yard hydrants providing the backup system.

Class II and III Hose stations are equipped with nozzles rated for the hazards present and with a sufficient amount of hose to support fire fighting needs in that area. Water spray or fog is not permitted in the new fuel storage vault. Portable extinguishers are acceptable in this area due to the low combustible loading and the metal covers over the new fuel vault.

Hose station equipment may, alternatively, be staged adjacent to or at the access to areas/locations to facilitate equipment availability. This may be necessary to address equipment concerns relative to personnel safety, ALARA practices, and logistical response needs.

The auxiliary building, control building, diesel generator building, intake pumping station, and ERCW pumping station are provided with a wet standpipe system. These systems have supply valves open and water pressure to the hose rack isolation valve. The Reactor Building (including the Annulus) is provided with a dry standpipe system. The standpipe systems within the RB are normally dry and are arranged to admit water into the systems through manual operation of push buttons located at each hose station.

The reactor building systems are controlled by electrically or manually operated flow control valves which are located in the AB. These systems are provided with automatic containment isolation capabilities for primary containment to address nuclear safety concerns where appropriate. In case a fire in primary containment causes a spurious containment isolation signal, flow to these systems can be reestablished by resetting the phase A isolation signal and opening the containment isolation valves.

12.3 Automatic Fire Suppression Systems

The automatic fire suppression systems are designed to extinguish a fire or control and minimize the effects of a fire until the fire brigade can respond and extinguish it. The automatic suppression systems consist of water based systems and total flooding CO_2 systems. In addition, manually actuated fixed water suppression systems are also addressed in this section.

There are typically four types of automatic suppression systems provided in safety-related areas at SQN:

a. automatic pre-action sprinkler systems
b. automatic fire suppression systems with closed water spray heads
c. automatic total flooding CO_2 systems
d. automatic pre-action water spray systems (see Part VI)

The annulus area of the Reactor Building has automatic pre-action sprinklers that serve as water spray on select cable concentrations to prevent specific cable interactions.

12.3.1 Pre-action Sprinkler Systems

Automatic pre-action sprinkler systems generally are provided in areas where it is important to prevent accidental discharge of water. In a pre-action sprinkler system, the piping network is maintained dry until water is needed for fire suppression. A deluge valve (sometimes referred to as a pre-action valve when used in a pre-action system) is used to control the water when the water is introduced into the piping network.

Operation of the pre-action sprinkler system is initiated by a signal from a detection system in the protected area. This signal causes the pre-action valve to open and fill the piping network. Actuation can also be initiated manually by mechanical operation at the pre-action valve. Selected pre-action sprinkler systems have manual actuation stations at strategic locations remote from the pre-action valve.

Water is then applied to the fire when the heat from the fire melts the fusible element in the sprinkler head. Water flow is stopped by manually closing the associated isolation valve.

12.3.2 Fire Suppression Systems with Closed Water Spray Heads

See Part VI.

12.3.3 Carbon Dioxide Suppression Systems

Automatic total flooding CO_2 suppression systems have been provided for the Auxiliary Instrument Rooms and Computer Room in the Control Building, and the Lube Oil Storage Room, each Diesel Engine Room (4), Fuel Oil Transfer Room, and each 480-V Board Rooms (4) in the Diesel Generator Building. See Part VI.

A signal from either the fire detection system or a push button station activates the area alarms, CO_2 discharge timer which actuates the master control valve and the area selector valve permitting the CO_2 to be discharged into the selected area. In addition, the system can be manually operated via the electro-manual pilot valve.

Personnel safety is considered by providing the pre-discharge alarm to notify anyone in the area that CO_2 is going to be discharged and by the addition of an odorizer to the CO_2 to warn personnel that CO_2 has been discharged. Additionally, abort switches are strategically located in the Unit 1 Auxiliary Instrument Room (685.0-C1), Unit 2 Auxiliary Instrument Room (685.0-C4), and Computer Room (685.0-C3) to allow for the discharge to be terminated by personnel in the area.

Actuation of the CO_2 system causes selective closure of dampers and doors to the area protected. HVAC fans to the protected areas in the diesel generator building are shutdown. This prevents spread of the fire and ensures that the minimum concentration of CO_2 is maintained. The duration of the discharge is determined by the area requirements and is controlled by the discharge timer.

The carbon dioxide system providing protection for the diesel generator building is stored in a tank at the diesel generator building. The diesel generator units are protected from the effects of a postulated failure of this storage tank by an 18-in thick reinforced concrete wall. Therefore, any missiles or pressure buildup generated by a rupture of the carbon dioxide storage tank would not damage safety-related equipment. The vent path for the storage tank compartment is through one set of double doors into a stairwell then, if needed, through another set of double doors which open to the atmosphere from the stairwell.

Carbon dioxide for the powerhouse areas is supplied from another storage tank in an underground vault in the yard; therefore, rupture or explosion of the tank cannot pose a threat to any safety-related structure.

12.3.4 Pre-action Water Spray Systems

See Part VI.

12.4 Manual Suppression Systems and Features

12.4.1 Portable Extinguishers

Portable fire extinguishers of a size and type compatible with specific hazards are located throughout the plant. Extinguishers may, alternatively, be staged adjacent to or at the access to areas/locations to facilitate equipment availability. This may be necessary to address personnel safety concerns, ALARA practices, and logistical response needs.

12.4.2 Manual Sprinkler Systems

Manually activated sprinkler systems are provided for the Post Accident System facility, Post Accident System filters, and the 125-volt vital battery and battery board rooms I, II, III, and IV. The piping network isolation valve is maintained in the closed position. Personnel are alerted to a problem in these areas by the fire detection system. After confirming there is a fire, personnel then open the appropriate isolation valve to allow water to the system. Water is applied to the fire when the heat from the fire melts the fusible element in the sprinkler head.

In the event of a fire in the elevation 669' corridor of the Control Building, manual initiation of the pre-action valve is required.

12.5 Fire Detection Systems

Fire detection is installed to provide for prompt detection of a fire in its incipient stage and provide early warning capability. Prompt detection of a fire will reduce the potential for damage to structures, systems and equipment and is an important part of the overall fire protection program at SQN. The fire detection systems at SQN are designed to be operable with or without offsite power.

The fire detection systems consist of initiating devices, proprietary protective signaling devices, local control panels, remote transmitter/receiver units which provide remote multiplex (MUX) functions, and computerized multiplex central control equipment.

The system processes the following signal types:

1. Alarm - A signal indicating the actuation of smoke or heat detectors or the sensing of flow through fire suppression systems. Also, some suppression supervision monitoring devices transmit an alarm signal.

2. Trouble - A signal indicating the occurrence of a fault condition in the proprietary protective signaling system.

3. Supervisory - A signal indicating a change in status of a zone. Several zones at Sequoyah Nuclear Plant are monitored with a supervision module that indicates a change in the status of the local zone without impacting normal operations of its associated local panel. This signal is indicated on the alarm console as a trouble condition.

One of the two central processor units (CPU) of the computerized multiplex central control equipment located in the main control room communicates with the local control panels via the remote transmitter/receiver

units over looped circuits. Only one of the CPU=s provided is required to be OPERABLE. A second CPU is installed and available for use in the event that the operating CPU fails. The CPU polls each panel connected to the multiplexor loop and has the capability to transmit panel commands and receive data from the panels.

When an initiating device changes from normal to a trouble or alarm status, it is detected at the local control panel and the remote transmitter/receiver will transmit this status change.

The status change is evaluated by the CPU and visual and audible indications are provided. The computerized multiplex central control equipment is located in a constantly attended location.

Where detection is provided for the protection of safety-related or FSSD equipment, Class A, four wire, supervised circuits link the fire detectors to the local control panels.

A status change generally results in the following system responses:

1. Audible and visual annunciation by the computerized multiplex central control equipment. This annunciation includes identification of the zone/area alarm panel location and the time of receipt of the status change on a cathode ray tube (CRT) and a printer. Trouble indication is for the panel only. The local panel provides further details on the alarm condition.

2. Illumination of indicating lamps on the local control panel indicating the status change.

3. Actuation of local control panel circuits for the control of automatic suppression systems, fire pumps, fire dampers, or ventilation equipment as appropriate for selected alarm status changes.

4. An alarm status change can be reset at the local control panel. Local control panel reset, in safety-related areas, can also be achieved through the computerized multiplex central control equipment.

A redundant printer is located in the Unit 2 Auxiliary Instrument Room.

The fire detection system for safety-related areas is comprised of different types of devices, components, or parts that provide the system functions of detection, annunciation, and/or activation of automatic suppression systems. The devices used are:

1. Smoke Detectors
    a. Ionization
    b. Photoelectric

2. Thermal Detectors

The thermal detectors are the rate compensation/fixed temperature type and are self restoring. They have temperature ratings appropriate for the area environment. Protecto-wire has been added to the cable trays in selected areas of the 480VAC Shutdown Board Rooms. This thermal detector is not self-restoring.

3. Air Duct Detectors

The air duct detectors are specifically designed to sense the presence of smoke or combustion

products in HVAC ducts.

4. Monitoring Devices

The fire detection system utilizes the following devices to monitor the fire suppression systems status.

a. Pressure Switch - piping integrity
b. Pressure Switch - for water flow
c. Pressure Switch - CO_2 discharge
d. Relay contacts - CO_2 abort and disablement

5. Manual Pull Stations

6. Power Supply

Two sources of 120V AC power are provided to the portion of the fire detection system protecting the safety-related equipment. The primary power supply is from Class 1E power sources with a high degree of reliability and adequate capacity for the intended service. The standby power is from the diesel generator.

Electrical isolation is provided between the fire detection system and the Class 1E power source from which it is supplied.

12.6 Lightning Protection

The basic principle to protecting life and property from damage or loss due to lightning is to provide a direct low impedance path for the lightning to travel to ground rather than through structures and/or equipment.

The lightning protection system consists of three basic parts which provide the low impedance path:

1. The air terminals on roofs and other elevated locations.
2. The ground grid.
3. The conductors connecting the air terminals to the ground grid.

12.7 Emergency Lighting

See Part V.

12.8 Communications

There are several means of communication available to Operations staff such as telephones; code, alarm, and paging; sound powered phones; and two-way radios. The in-plant radio repeater system will be the primary means of communication for performing manual actions and for the fire brigade use.

The in-plant radio repeater system consists of multiple VHF radio repeaters, remote control units, portable radios, and redundant antenna systems.

A sound powered phone system connects the auxiliary control room and various local control stations to

supplement the VHF radio during alternative shutdown.

12.9 Reactor Coolant Pump Oil Collection

See Part V.

12.10 Fire-Rated Assemblies

Fire rated assemblies at SQN are part of the passive fire protection features which ensure that the function of one set of redundant fire safe shutdown components necessary to achieve and maintain FSSD remains free of fire damage. Fire rated assemblies consist of fire barriers, Electrical Raceway Fire Barrier Systems (ERFBS), equipment hatches and stairwells, fire doors, fire dampers, radiant energy shields, penetration seals, walls, floors, and ceilings. Fire barriers and fire doors are identified on the compartmentation drawings in Part X of the FPR.

12.10.1 Walls, Floors, and Ceilings

Fire areas are separated by 1.0, 1.5- or 3-hour equivalent fire barriers that are bounded by UL rated designs or equivalent. Rooms within each fire area may be separated from other rooms in the same area by FSSD or non-FSSD fire barriers. Where fire barriers are used to separate rooms in the same area, the barriers have equivalent 1.0 or 1.5- hour fire ratings. If the FSSD separation between rooms in the same fire area is less than 3-hour, then automatic suppression and detection systems are provided or deviations justified (see Part VII for the discussion of deviations and evaluations).

12.10.2 Raceway Protection

Cable raceways that require separation by Electrical Raceway Fire Barrier Systems (ERFBS) are provided with one-hour rated ERFBS (subject to Thermo-Lag upgrade and deviation request) and automatic suppression and detection in the area (except as allowed by approved deviations). Inside the reactor building, which includes primary containment and secondary containment (i.e., annulus), a combination of radiant energy shields and automatic detection and suppression are used to obtain separation where fire could potentially damage redundant safe shutdown components.

12.10.3 Equipment Hatches and Stairwell

Equipment hatches in floor or ceiling fire barriers fall into three categories:

a) Pre-cast concrete plugs which overlap mating surfaces for support - These plugs are usually associated with radiation shielding and provide a fire barrier equivalent to the floor or ceiling in which they are located.

b) Steel covers that overlap mating surfaces for support - These covers are of substantial construction and provide an effective barrier to prevent fire from propagating from one side of the barrier to the other.

However, since they are not fire rated, they are either provided with a fire barrier coating, evaluated in accordance with GL 86-10, or redundant safe shutdown components on either side have been separated from each other by a cumulative horizontal distance of 20 or more

feet. In either case, automatic fire suppression and detection are provided on both sides of the equipment hatch cover, if appropriate, or an engineering evaluation has been performed. See Part VII for justifications of deviations and/or evaluations.

c) Open hatches and stairwells - Redundant safe shutdown components located on each side of the opening have been identified. If separated by less than a cumulative distance of 20 feet horizontally, either the hatch/stairwell has been provided with a water curtain to separate elevations, or a one hour fire barrier has been provided on the cables for one of the redundant paths. In either case automatic fire suppression and detection has been provided on both sides of the opening, except for the refueling area and the 653 ft elevation of the Auxiliary Building. See Part VII for justifications for deviations and/or evaluations.

12.10.4 Fire Doors

Fire door assemblies (doors, frames, and hardware) are generally provided in door openings in required fire barriers. These assemblies are UL listed as either "A" label (3-hour rated) or "B" label (1-1/2 hour rated). "A" label doors are provided in 3-hour or less rated fire barriers and "B" label doors are provided in barriers that require a 2-hour or less fire rating.

Sliding fire doors are provided in selected locations. These sliding fire doors are closed by heat melting a fusible link and in selected CO_2 protected areas, a CO_2 system pressure-activated, or electrical release, or a combination of both.

In some cases, such as air lock doors, equipment doors, submarine type doors, etc., the doors cannot be purchased as labeled fire doors. These doors have been evaluated by a Fire Protection Engineer for their ability to prevent the propagation of a fire. These evaluations are documented in Part VII, Deviations, or in other Engineering documentation.

Modifications to fire doors must be within accepted criteria or approved by a Fire Protection Engineer. Fire doors can be repaired under defined criteria and with the approval of the Fire Protection Engineer through the design output process.

12.10.5 Fire Dampers

Fire dampers are normally provided in fire barriers and in HVAC ducts that penetrate required fire barriers to prevent the propagation of a fire through the barrier. Some duct penetrations, shown on the compartmentation drawings as unprotected openings without dampers, have been evaluated as acceptable barrier openings, acceptable partial barriers, or equivalent fire barriers. In some cases, the fire damper is also used to isolate an area prior to CO_2 discharge. Fire dampers are provided with appropriately rated fusible links based on the ambient temperatures in the location.

Some dampers are also supplied with electro - thermo links (ETL) that are electrically activated in response to a signal from the fire detection system. The fire dampers provided with CO_2 suppression system isolation capability are actuated by CO_2 system pressure activated release mechanism and/or by thermal link. Fire dampers in safety-related HVAC systems may have double fusible links installed if required by a single failure analysis.

12.10.6 Penetration Seals

When plant commodities (i.e., pipe, cable trays, conduits, etc.) must pass through required fire barriers, the openings are provided with seals that meet or exceed the fire protection requirements of the barrier. The majority of mechanical and electrical penetration seals used at Sequoyah have been bounded by fire tests. For the remaining population of penetration seals, evaluations have been performed in accordance with USNRC Generic Letter 86-10 to determine the acceptability of the seals in their "as-built" configuration. The fire protection design basis for the penetration seal program is contained in Reference 4.2.9, System Description Document N2-302-400, "Penetration Seals" (formerly issued as "SQN Penetration Seal Program Assessment Report, No. 0006-00902-01"). The system description provides: verification of conformance to the required standards for each of the fire endurance tests used to qualify the penetration seals; schematics and evaluations for the limiting parameters of each typical detail; and general discussions of pertinent penetration seal issues.

In addition to fire protection capabilities, some penetration seals may be required to meet other plant design bases requirements such as radiation shielding, HVAC pressure differential, and/or flood.

12.10.6.1 Electrical Penetrations

Conduit penetrations typically require only internal seals since most conduit penetrations were poured-in-place during plant construction. Internal seal materials, design, and locations in walls and floor/ceiling assemblies have been evaluated as equivalent to tested configurations. If a conduit requires an external seal (e.g., the conduit passed through a sleeve larger than the conduit), the external seal will meet the same criteria as stated in the above paragraph. The criteria for internal conduit seals are provided by site-specific drawings.

13.0 FIRE PROTECTION SYSTEM IMPAIRMENTS AND COMPENSATORY ACTIONS

Fire protection impairments are controlled to maximize the availability of the active and passive fire protection systems and features. Fire protection systems and features are intended to remain fully operational to the maximum extent possible. However, it is expected that outages or impairments will occur to support plant or fire protection-related modifications or maintenance.

Compensatory actions for impaired fire protection systems are defined in the applicable sections of this plan. When fire watches are assigned as compensatory measurers for fire protection systems or features, their principle purpose/responsibilities are to:

1. Detect fire or conditions of potential fire (i.e. smoke, flames, etc.).
2. Communicate observation of detected fire or conditions of potential fire to the control room.
3. Notify personnel in the immediate area of the fire to evacuate the immediate area, if time permits.

Alternate compensatory actions for fire watch such closed circuit television may be utilized on a case by case basis. This alternative action is considered when the primary methods create further hazards or represent personnel safety concerns.

A summary of each of these primary and alternate compensatory actions are as follows:

A. Fire Watch - Continuous (Primary)

A continuous fire watch is required when the potential exists for a single fire to damage redundant trains of the minimum fire safe shutdown (FSSD) equipment necessary to achieve and maintain cold shutdown conditions in the event of a fire. 10CFR Appendix R, Section III.G.1 states: "Fire protection features shall be provided for structures, systems and components important to safe shutdown. These features shall be capable of limiting fire damage so that:

a. One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage; and
b. Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours."

A single fire is a fire that is postulated to occur in any plant area that is separated from other plant areas by boundary fire barriers or substantial spatial separation. Each area of the plant is assigned a fire area or fire zone designation such as FAA-1, FAA-2, FAC-1, FAC-2, etc. As an example, a fire is postulated to occur in FAA-1 or FAA-2 but not in FAA-1 and FAA-2 simultaneously.

The fire areas/zones are separated from each other by minimum 1-1/2 hour fire rated boundaries, with approved deviations, or in some cases, substantial spatial separation such as between the Auxiliary Building and the CCW Pump Station or the ERCW Pump Station. Therefore, an hourly fire watch is considered adequate detection capability to prevent an otherwise undetected fire from breaching the boundary fire barriers and spreading to an adjacent fire area/zone where redundant FSSD equipment may be located.

When redundant trains of FSSD equipment are located within the same fire area/zone the protection that has generally been provided is 1 hour rated Thermo-Lag Electrical Raceway Fire Barrier Systems (ERFBS), or a minimum of 20 feet of horizontal separation with no intervening combustibles, and an automatic fire detection and suppression system. Other protection arrangements for redundant FSSD equipment located in the same fire area/zone are described in approved deviations to 10CFR50 Appendix R requirements (i.e. Counting Room). In all of these cases, an hourly fire watch is not considered adequate detection capability to prevent an otherwise undetected fire from damaging both trains of redundant FSSD equipment.

A continuous fire watch requires that individual(s) inspect the specified area at least once every 15 minutes with a margin of 5 minutes.

B. Fire Watch - Roving (Primary)

All hourly fire watch patrols require that a trained individual be in the specified area at intervals of 60 minutes with a margin of 15 minutes.

C. Closed Circuit Television -CCTV (Alternative)

CCTV equipment consists of CCTV cameras and monitors. Cameras may be placed in more than one room or more than one elevation of the plant. CCTV systems are similar to the ones used by other utilities for monitoring of inoperable fire barriers as well as CCTVs previously utilized at Browns Ferry Nuclear Plant in inaccessible tunnels. An evaluation will be performed by the plant fire protection staff and documented with the impairment process (appropriate administrative process) or work initiation document for use of CCTV equipment (cameras and monitors) to demonstrate technical equivalency to standard compensatory actions identified in Section 14, "Fire Protection Systems and Features Operating Requirements (OR)."

CCTV monitors are monitored by trained personnel at a frequency consistent with standard compensatory actions identified in Section 14, "Fire Protection Systems and Features Operating Requirements (OR)." CCTV is used in instances where conditions may present risks to personal safety, operational conditions in high heat areas such as the main steam vault, or ALARA concerns in high radiation areas preclude using a human fire watch in the area.

D. Procedural Controls (Strict Administrative Measures)

Procedural controls as discussed in GL 91-18 may be utilized as compensatory measures to require immediate actions to be taken to restore a system or feature back to OPERABLE status in the event of a fire emergency in an affected area. These controls will further require strict administrative measures to ensure the system or feature is not left unattended unless either the system or feature is restored back to operable status or a fire watch is established. In the event procedural controls are utilized as compensatory measures, an evaluation will be performed by the plant fire protection staff and documented as part of the affected procedure change and revision process.

The evaluation will demonstrate the technical equivalency to standard compensatory actions identified in Section 14, *Fire Protection Systems and Features Operating Requirements (OR).*

SECTION 14.0 - OPERATING REQUIREMENTS
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14.0 FIRE PROTECTION SYSTEMS AND FEATURES OPERATING REQUIREMENTS (OR) AND SURVEILLANCE REQUIREMENTS (SR)

The OR established in this section have been developed to ensure adequate fire protection capability is available and maintained, to detect, control, and extinguish fires occurring in any portion of the plant where safety-related or Fire Safe Shutdown (FSSD) equipment are located. Calculation SQN-SQS2-203, "Evaluation of Fire Safe Shutdown Equipment for IE Notice 97-048," addresses equipment required for FSSD which is not bounded by existing Technical Specifications. Since these components are not fire protection equipment, they are also not controlled by an existing FOR. Based on a review of each component determined to be required for FSSD, the calculation determines that the FSSD equipment not covered through existing Surveillance Instructions is equipment essential for normal operation of the plant, and as such, receives high priority for maintenance and return to operable status, which will ensure that they are available for FSSD purposes.

Fire protection systems and features at SQN are not assumed to be operable to mitigate the consequences of a Design Basis Accident (DBA) or plant transient in conjunction with a fire. The bases for this assumption are contained in Section I of Appendix R which states that the need to limit fire damage to systems required to achieve and maintain FSSD conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of DBAs. As a result, Section L of 10CFR50, Appendix R, identifies that fire protection features must be capable of limiting fire damage so that:

1. One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room, auxiliary control room, or emergency control stations is free of fire damage; and

2. Systems necessary to achieve and maintain cold shutdown from either the control room, auxiliary control room, or emergency control stations can be repaired within 72 hours.

3. Alternate shutdown capability is provided when needed to achieve and maintain cold shutdown within 72 hours.

Testing of the fire protection systems involve manually disabling portions of them to prevent unwanted responses. These responses can be in the form of excessive starting of pumps, discharging water in a radiologically controlled area, excessive alarming of devices/components, and undesirable actuation of systems/components. In many cases when test personnel are actively performing the test (system under control of test performers), compensatory measures (i.e., fire watches) will not be required. The test personnel may be credited for returning the system under test to normal operational alignment in the event of a fire that would require the system to function. These situations are controlled by the procedure governing the test or by other administrative controls established for the performance of the test. Factors considered in determining when test personnel may be credited for manual action to restore a system to operational status include ability of test personnel to recognize input signals, communications between test personnel, and timing required to restore the system to functional status.

14.0.1 Compliance with the Operating Requirements (OR) contained in the succeeding Specifications is required during the APPLICABILITY or other conditions specified therein; except that upon failure to meet the Limiting Conditions for Operations, the associated ACTION requirements shall be met.

14.0.2 Noncompliance with a Specification shall exist when the requirements of the Operating Requirements (OR) and associated ACTION requirements are not met within the specified time intervals. If the OR is restored prior to expiration of the specified time intervals, completion of the ACTION requirements is not required.

14.0.3 Entry into an OPERATIONAL MODE or other specified condition may be made with reliance on provisions contained in the ACTION requirements. This provision shall not prevent passage through OPERATIONAL MODES as required to comply with ACTION requirements.

14.0.4 When a system, subsystem, train, component or devise is determined to be inoperable solely because its emergency power source in inoperable, or solely because its normal power source is inoperable, it may be considered OPERABLE for the purpose of satisfying the requirements of its applicable Limiting Condition of Operation, provided: (1) its corresponding normal or emergency power source is OPERABLE; and (2) all of its redundant system(s), subsystem(s), trains(s), component(s) and device(s) are OPERABLE, or likewise satisfy the requirements of this Specification.

14.0.5 Surveillance Requirements (SR) shall be met during the OPERATIONAL MODES or other conditions specified for individual Limiting Conditions for Operations unless otherwise stated in an individual SR.

14.0.6 Each SR shall be performed within the specified surveillance interval with a maximum allowable extension not to exceed twenty-five percent (25%) of the specified surveillance interval.

14.0.7 Failure to perform a SR within the allowed surveillance interval, defined by Section 14.0.5, shall constitute noncompliance with the OPERABILITY requirements for a Limiting Condition of Operation. The time limits of the ACTION requirements are applicable at the time it is identified that a SR has not been performed. The ACTION requirements may be delayed for up to twenty-four (24) hours to permit the completion of the surveillance when the allowable outage time limits of the ACTION requirements are less than twenty-four (24) hours. SR's do not have to be performed on inoperable equipment.

14.1 FIRE DETECTION INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.8 As a minimum, the fire detection instrumentation for each fire detection zone shown in Table 3.3-11 shall be OPERABLE.

APPLICABILITY: Whenever equipment protected by the fire detection instrument is required to be OPERABLE.*

ACTION:

a. With the alarm function associated with the fire detection instruments INOPERABLE:

1. For areas other than Containment:

a. For fire detection instrumentation that is associated with fire suppression systems required to be OPERABLE per LCO 3.7.11.2 or 3.7.11.3, within one hour establish a continuous fire watch in areas where redundant systems or components could be damaged; for other areas, establish an hourly fire watch patrol.

b. For fire detection instrumentation that is not associated with fire suppression systems required to be OPERABLE per Section 3.7.11.2 or 3.7.11.3, within one hour establish an hourly fire watch patrol.

2. For inoperable equipment inside Containment, inspect the Containment at least once per 8 hours or monitor the containment air temperature at least once per hour at the following locations:

Primary Containment Upper Compartment		Primary Containment Lower Compartment	
(1)	Elevation 743 ft.	(4)	Elevation 722 ft.
(2)	Elevation 786 ft.	(5)	Elevation 700 ft.
(3)	Elevation 786 or 845 ft.	(6)	Elevation 685 or 703 ft.

b. With the fire detection instrumentation INOPERABLE for reasons other than loss of the alarm function, enter the applicable LCO of Section 3.7.11.2 and/or 3.7.11.3 for those automatic suppression systems with no automatic actuation available.

c. Restore the inoperable instrument(s) to OPERABLE status within 14 days. If not restored to OPERABLE within 14 days, perform corrective action/reportability reviews in accordance with site administrative procedures.

SURVEILLANCE REQUIREMENTS (SR)

4.3.3.8.1 Each of the above required fire detection instruments which are accessible during operation shall be demonstrated OPERABLE at least once per 6 months by performance of a CHANNEL FUNCTIONAL TEST. Fire detection which are not accessible during plant operation shall be demonstrated OPERABLE by the performance of a CHANNEL FUNCTIONAL TEST during each COLD SHUTDOWN exceeding 24 hours unless performed in the previous 6 months.

4.3.3.8.2 The NFPA Code 72D supervised circuits supervision associated with the detector alarms of each of the above required fire detection instruments shall be demonstrated OPERABLE at least once per 6 months.

4.3.3.8.3 The non-supervised circuits between the local fire protection panels and actuated equipment shall be demonstrated OPERABLE at least once per 6 months.

* The fire detection instruments located within the containment are not required to be OPERABLE during the performance of Type A Containment Leakage Rate Tests.

TABLE 3.3-11

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MINIMUM INSTRUMENTS OPERABLE

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
1	Diesel Gen. Rm. 2B-B, E1. 722			5	
2	Diesel Gen. Rm. 2B-B, E1. 722			5	
3	Diesel Gen. Rm. 1B-B, E1. 722			5	
4	Diesel Gen. Rm. 1B-B, E1. 722			5	
5	Diesel Gen. Rm. 2A-A, E1. 722			5	
6	Diesel Gen. Rm. 2A-A, E1. 722			5	
7	Diesel Gen. Rm. 1A-A, E1. 722			5	
8	Diesel Gen. Rm. 1A-A, E1. 722			5	
9	Lube Oil Storage Rm. E1. 722			1	
10	Lube Oil Storage Rm. E1. 722			1	
11	Fuel Oil Transfer Rm. E1. 722			1	
12	Fuel Oil Transfer Rm. E1. 722			1	
13	Diesel Gen. Corridor, E1. 722			6	
14	Air Intake & Exhaust Rm. 2B, E1. 740.5			9	
15	Air Intake & Exhaust Rm. 1B, E1. 740.5			9	
16	Air Intake & Exhaust Rm. 2A, E1. 740.5			9	
17	Air Intake & Exhaust Rm. 1A, E1. 740.5			9	
18	Diesel Gen. 2B-B Relay Bd., E1. 722	3			
19	Diesel Gen. 1B-B Relay Bd., E1. 722	3			
20	Diesel Gen. 2A-A Relay Bd., E1. 722	3			
21	Diesel Gen. 1A-A Relay Bd., E1. 722	3			
22	Diesel Gen. Bd. Rm. 2B-B, E1. 740.5	2			
23	Diesel Gen. Bd. Rm. 2B-B, E1. 740.5			2	
24	Diesel Gen. Bd. Rm. 1B-B, E1. 740.5	2			
25	Diesel Gen. Bd. Rm. 1B-B, E1. 740.5			2	
26	Diesel Gen. Bd. Rm. 2A-A, E1. 740.5	2			
27	Diesel Gen. Bd. Rm. 2A-A, E1. 740.5			2	
28	Diesel Gen. Bd. Rm. 1A-A, E1. 740.5	2			
29	Diesel Gen. Bd. Rm. 1A-A, E1. 740.5			2	
30	Cable Spreading Rm. C7-C11, E1. 706	14			
31	Cable Spreading Rm. C7-C11, E1. 706	14			
32	Cable Spreading Rm. C7-C11, E1. 706	14			
33	Cable Spreading Rm. C7-C11, E1. 706	14			
34	Cable Spreading Rm. C3-C7, E1. 706	14			
35	Cable Spreading Rm. C3-C7, E1. 706	14			
39	Cont. Spray Pump 1A-A, El. 653	2			
40	Cont. Spray Pump 1B-B, El. 653	2			
41	Cont. Spray Pump 2A-A, El. 653	2			
42	Cont. Spray Pump 2B-B, El. 653	2			
43	RHR Pump 1A-A, El. 653	2			
44	RHR Pump 1B-B, El. 653	2			
45	RHR Pump 2A-A, El. 653	2			
46	RHR Pump 2B-B, El. 653	2			
47	Aux. Bldg. Corridor, El. 653	10			
[illegible]	Corridor, Control Bldg. E1. 669	4			

TABLE 3.3-11

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MINIMUM INSTRUMENTS OPERABLE

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
49	Corridor, Control Bldg. E1. 669	4			
50	Mech. Equip. Rm. Col. C1, E1. 669	2			
51	Mech. Equip. Rm. Col. C1, E1. 669			2	
52	Mech. Equip. Rm. Col. C3, E1. 669	2			
53	Mech. Equip. Rm. Col. C3, E1. 669			2	
54	250-V Batt. Rm. 1, E1. 669	3			
55	250-V Batt. Rm. 1, E1. 669			3	
56	250-V Batt. Bd. Rm. 1, E1. 669	2			
57	250-V Batt. Bd. Rm. 1, E1. 669	2			
58	250-V Batt. Bd. Rm. 2, E1. 669	2			
59	250-V Batt. Bd. Rm. 2, E1. 669	2			
60	250-V Batt. Rm. 2, E1. 669	3			
61	250-V Batt. Rm. 2, E1. 669			3	
62	24-V & 48-V Batt. Rm. E1. 669	3			
63	24-V & 48-V Batt. Rm. E1. 669			3	
64	24-V & 48-V Batt. Bd. Rm., E1. 669	2			
65	24-V & 48-V Batt. Bd. Rm., E1. 669	2			
66	Communications Rm. E1. 669	4			
67	Communications Rm. E1. 669	4			
68	Mech. Equip. Rm. E1. 669	2			
69	Mech. Equip. Rm. E1. 669			2	
70	Aux. Bldg. A5-A11, CoL.W-X, E1. 669	5			
71	Aux. Bldg. A5-A11, CoL.W-X, E1. 669	5			
72	Aux. FW Pump Turbine 1A-S, El. 669	1			
73	Aux. FW Pump Turbine 1A-S, El. 669			1	
74	Aux. FW Pump Turbine 2A-S, El. 669	1			
75	Aux. FW Pump Turbine 2A-S, El. 669			1	
76	S. I. & Charging Pump Rms. El. 669			5	
77	S. I. Pump Rm. 1A, El. 669	1			
78	S. I. Pump Rm. 1B, El. 669	1			
79	Charging Pump Rm. 1C, El. 669	1			
80	Charging Pump Rm. 1B, El. 669	1			
81	Charging Pump Rm. 1A, El. 669	1			
82	S. I. & Charging Pump Rms. El. 669			5	
83	S. I. Pump Rm. 2A, El. 669	1			
84	S. I. Pump Rm. 2B, El. 669	1			
85	Charging Pump Rm. 2A, El. 669	1			
86	Charging Pump Rm. 2B, El. 669	1			
87	Charging Pump Rm. 2C, El. 669	1			
88	Aux. Bldg. Corridor A1-A8, E1. 669	8			
89	Aux. Bldg. Corridor A1-A8, E1. 669	8			
90	Aux. Bldg. Corridor A8-A15, E1. 669	8			
91	Aux. Bldg. Corridor A8-A15, E1. 669	8			
92	Aux. Bldg. Corridor Co1. U-W, E1. 669	4			
93	Aux. Bldg. Corridor Col. U-W, El. 669	4			

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MINIMUM INSTRUMENTS OPERABLE

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
94	Valve Galley, El. 669	2			
95	Valve Galley, El. 669	2			
96	U/2 Valve Galley, El. 669	2			
97	U/2 Valve Galley, El. 669	2			
98	U/1 Cntmt Purge Air Fltr., El. 690		2	2	
99	U/1 Cntmt Purge Air Fltr., El. 690		2	2	
100	U/2 Cntmt Purge Air Fltr., El. 690		2	2	
101	U/2 Cntmt Purge Air Fltr. El. 690		2	2	
102	U/1 Pipe Gallery, El. 690	4			
103	U/1 Pipe Gallery, El. 690	4			
104	U/2 Pipe Gallery, El. 690	4			
105	U/2 Pipe Gallery, El. 690	4			
106	Aux. Bldg., E1. 690	8			
107	Aux. Bldg., E1. 690	8			
108	Radio Chemical Lab. Area, E1. 690	3			
109	Radio Chemical Lab. Area, E1. 690	3			
110	Aux. Bldg. A1-A8, Co1. Q-U, E1. 690	10			
111	Aux. Bldg. A1-A8, Co1. Q-U, E1. 690	10			
112	Aux. Bldg. A8-A15, Co1. Q-U, E1. 690	9			
113	Aux. Bldg. A8-A15, Co1. Q-U, E1. 690	9			
14	Waste Pkg. Area, E1. 706	3			
115	Waste Pkg. Area E1. 706	3			
116	Cask Loading Area E1. 706			4	
117	Cask Loading Area E1. 706			4	
118	New Fuel Storage Area E1. 706	2			
119	New Fuel Storage Area E1. 706	2			
120	Aux. Bldg. Gas Trtmt. Fltr. El. 714		1	1	
121	Aux. Bldg. Gas Trtmt. Fltr. El. 714		1	1	
122	Add. Eqpt. Bldg., E1. 706 & 717.5	6			
123	Volume Cont. Tank Rm. 1A, El. 690	1	1		
124	Additional Equip. Bldg. E1. 706	6			
125	Volume Cont. Tank Rm. 1A, El. 690	1	1		
126	ABGTS Rm. E1. 714	2			
127	ABGTS Rm. E1. 714	2			
128	ABGTS Rm. E1. 714	2			
129	ABGTS Rm. E1. 714	2			
130	Ventilation & Purge Air Rm. E1. 714	3			
131	Ventilation & Purge Air Rm. E1. 714	3			
132	Ventilation & Purge Air Rm. E1. 714	3			
133	Ventilation & Purge Air Rm. E1. 714	3			
134	Aux. Bldg. A5-A11, Co1. U-W, E1. 714	7			
135	Aux. Bldg. A5-A11, Co1. U-W, E1. 714	7			
136	Heating & Vent. Rm. E1. 714	4			
137	Heating & Vent. Rm. E1. 714	4			
38	Heating & Vent. Rm. E1. 714	4			

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MINIMUM INSTRUMENTS OPERABLE

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
139	Heating & Vent. Rm. E1. 714	5			
140	Above Hot Instr. Rm. El. 714	1			
141	Above Hot Instr. Rm. E1. 714	1			
142	Aux. Bldg. A1-A8, Co1. Q-U, E1. 714	12			
143	Aux. Bldg. A1-A8, Co1. Q-U, E1. 714	12			
144	Aux. Bldg. A8-A15, Co1. Q-U, E1. 714	9			
145	Aux. Bldg. A8-A15, Co1. Q-U, E1. 714	9			
146	N_2 Storage Area, E1. 706	4			
147	ABGTS filter, E1. 714		1	1	
148	ABGTS Filter, E1. 714		1	1	
149	Cable Spreading Rm. C3-C7, E1. 706	15			
150	Cable Spreading Rm. C3-C7, E1. 706	15			
151	VCT Room 2A, EL. 690	1	1		
152	VCT Room 2A, EL. 690	1	1		
153	Add. Eqpt. Bldg. E1. 740.5	4			
154	Add. Eqpt. Bldg. E1. 740.5	6			
155	Refuel Rm. E1. 734	19			
156	U/1 RB Access Rm. El. 734	2			
157	U/1 RB Access Rm. El. 734	2			
158	U/2 RB Access Rm. El. 734	2			
159	U/2 RB Access Rm. El. 734	2			
160	SG Blwdn. Rm. E1. 734	4			
161	SG Blwdn. Rm. E1. 734	4			
162	EGTS Rm. E1. 734	3			
163	EGTS Rm. E1. 734	3			
164	EGTS Fltr. A E1. 734		1	2	
165	EGTS Fltr. A E1. 734		1	2	
166	EGTS Fltr. B E1. 734		1	2	
167	EGTS Fltr. B E1. 734		1	2	
172	Mech. Eqpt. Rm. E1. 734	1			
173	Mech. Eqpt. Rm. E1. 734	1			
174	Mech. Eqpt. Rm. E1. 734	1			
175	Mech. Eqpt. Rm. E1. 734	1			
176	480-V Shtdn. Bd. Rm. 1A1, E1. 734	2			
177	480-V Shtdn. Bd. Rm. 1A1, E1. 734	2			
178	480-V Shtdn. Bd. Rm. 1A2, E1. 734	2			
179	480-V Shtdn. Bd. Rm. 1A2, E1. 734	2			
180	480-V Shtdn. Bd. Rm. 1B1, E1. 734	2			
181	480-V Shtdn. Bd. Rm. 1B1 E1. 734	2			
182	480-V Shtdn. Bd. Rm. 1B2 E1. 734	3			
183	480-V Shtdn. Bd. Rm. 1B2 E1. 734	3			
184	6.9-KV Shtdn. Bd. Rm. A	7			
185	6.9-KV Shtdn. Bd. Rm. A	7			
186	6.9-KV Shtdn. Bd. Rm. B	7			
187	6.9-KV Shtdn. Bd. Rm. B	7			

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MINIMUM INSTRUMENTS OPERABLE

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
188	480-V Shtdn. Bd. Rm. 2A1 E1. 734	2			
189	480-V Shtdn. Bd. Rm. 2A1 E1. 734	2			
190	480-V Shtdn. Bd. Rm. 2A2 E1. 734	3			
191	480-V Shtdn. Bd. Rm. 2A2 E1. 734	3			
192	480-V Shtdn. Bd. Rm. 2B1 E1. 734	2			
193	480-V Shtdn. Bd. Rm. 2B1 E1. 734	2			
194	480-V Shtdn. Bd. Rm. 2B2 E1. 734	2			
195	480-V Shtdn. Bd. Rm. 2B2 E1. 734	2			
196	125-V Batt. Bd. Rm. I E1. 734	1			
197	125-V Batt. Bd. Rm. I E1. 734	1			
198	125-V Batt. Bd. Rm. II E1. 734	1			
199	125-V Batt. Bd. Rm. II E1. 734	1			
200	125-V Batt. Bd. Rm. III E1. 734	1			
201	125-V Batt. Bd. Rm. III E1. 734	1			
202	125-V Batt. Bd. Rm. IV E1. 734	1			
203	125-V Batt. Bd. Rm. IV E1. 734	1			
204	Aux. CR E1. 734	2			
205	Aux. CR E1. 734	2			
206	Aux. CR Inst. Rm. 1A E1. 734	1			
207	Aux. CR Inst. Rm. 1A E1. 734	1			
208	Aux. CR Inst. Rm. 1B E1. 734	1			
209	Aux. CR Inst. Rm. 1B E1. 734	1			
210	Aux. CR Inst. Rm. 2A E1. 734	1			
211	Aux. CR Inst. Rm. 2A E1. 734	1			
212	Aux. CR Inst. Rm. 2B E1. 734	1			
213	Aux. CR Inst. Rm. 2B E1. 734	1			
214	Mech. Eqpt. Rm. E1. 732	5			
215	Mech. Eqpt. Rm. E1. 732	5			
216	CR Fltr. B E1. 732	1		1	
217	CR Fltr. B E1. 732	1		1	
218	CR Fltr. A E1. 732	1		1	
219	CR Fltr. A E1. 732	1		1	
220	Main CR E1. 732	25			
221	Technical Support Center, E1. 732	5			
222	Technical Support Center, E1. 732	5			
225	Relay Bd. Rm. E1. 732	13			
226	Electric Cont. Bds. E1. 732	11			
227	Oper. Living Area E1. 732	7		1	
228	Oper. Living Area E1. 732			8	
229	Main Cont. Bds. E1. 732	9			
230	Aux. CR Bds. L-4A, 4C, 11A & 10, E1. 734	10			
233	Ctrl. Rod Dr. Eqpt. Rm. E1. 759	4			
234	Ctrl. Rod Dr. Eqpt. Rm. E1. 759	4			
235	Ctrl. Rod Dr. Eqpt. Rm. E1. 759	4			
236	Ctrl. Rod Dr. Eqpt. Rm. E1. 759	4			

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
237	Mech. Eqpt. Rm. E1. 749	1			
238	Mech. Eqpt. Rm. E1. 749	1			
239	Mech. Eqpt. Rm. E1. 749	2			
240	Mech. Eqpt. Rm. E1. 749	2			
241	480-V XFMR Rm. 1A E1. 749	3			
242	480-V XFMR Rm. 1A E1. 749	3			
243	480-V XFMR Rm. 1B E1. 749	3			
244	480-V XFMR Rm. 1B E1. 749	3			
245	480-V XFMR Rm. 2A E1. 749	3			
246	480-V XMFR Rm. 2A E1. 749	3			
247	480-V XMFR Rm. 2B E1. 749	3			
248	480-V XMFR Rm. 2B E1. 749	3			
249	125-V Batt. Rm. I E1. 749	1			
250	125-V Batt. Rm. I E1. 749	1			
251	125-V Batt. Rm. II E1. 749	1			
252	125-V Batt. Rm. II E1. 749	1			
253	125-V Batt. Rm. III E1. 749	1			
254	125-V Batt. Rm. III E1. 749	1			
255	125-V Batt. Rm. IV E1. 749	1			
256	125-V Batt. Rm. IV E1. 749	1			
257	480-V Bd. Rm. 1B E1. 749	4			
258	480-V Bd. Rm. 1B E1. 749	4			
259	480-V Bd. Rm. 1A E1. 749	4			
260	480-V Bd. Rm. 1A E1. 749	4			
261	480-V Bd. Rm. 2A E1. 749	4			
262	480-V Bd. Rm. 2A E1. 749	4			
263	480-V Bd. Rm. 2B E1. 749	4			
264	480-V Bd. Rm. 2B E1. 749	4			
267	Aux. Inst. Rm. E1. 685	8			
268	Aux. Inst. Rm. E1. 685			9	
269	Computer Rm. E1. 685	4			
270	Computer Rm. E1. 685			4	
271	Aux. Instr. Rm. E1. 685	8			
272	Aux. Instr. Rm. E1. 685			9	
273	Computer Rm. Corridor	3			
276	Intk. Pump Sta. E1. 690 & 670.5	15			
277	ERCW Pump Sta. E1. 704	21		8	
296	Aux. CR Bds. L-4B, 4D, & 11B, El. 734	6			
297	Main Cont. Bds.	9			
298	Common Main CR Bds. El 732	9			
330	U/1 Reactor Building Annulus		3		
331	U/1 Reactor Building Annulus		4		
332	U/2 Reactor Building Annulus		3		
333	U/2 Reactor Building Annulus		4		
342	U/1 Lwr. Compt. Coolers, E1. 693		4		

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
353	U/2 Lwr. Compt. Coolers, E1. 693		4		
354	U/1 Upr. Compt. Coolers, E1. 778		4		
355	U/2 Upr. Compt. Coolers, E1. 778		4		
356	U/1 RCP 2, E1. 693			2	
357	U/1 RCP 2, E1. 693			2	
358	U/2 RCP 2, E1. 693			2	
359	U/2 RCP 2, E1. 693			2	
360	U/1 RCP 1, E1. 693			2	
361	U/1 RCP 1, E1. 693			2	
362	U/2 RCP 1, E1. 693			2	
363	U/2 RCP 1, E1. 693			2	
364	U/1 RCP 3, E1. 693			2	
365	U/1 RCP 3, E1. 693			2	
366	U/2 RCP 3, E1. 693			2	
367	U/2 RCP 3, E1. 693			2	
368	U/1 RCP 4, E1. 693			2	
369	U/1 RCP 4, E1. 693			2	
370	U/2 RCP 4, E1. 693			2	
371	U/2 RCP 4, E1. 693			2	
372	U/1Reactor Bldg. Annulus		22		
373	U/1 Reactor Bldg. Annulus		21		
374	U/2 Reactor Bldg. Annulus		20		
375	U/2 Reactor Bldg. Annulus		19		
387	Turbine Cont. Bldg. Wal1, E1. 706			19	
427	125V Batt. Rm. V E1. 749	2			
428	125V Batt. Rm. V E1. 749	2			
458	Counting Room Ceiling E1. 690	2			
462	480V Sd Bd Rm 1B2 E1. 734			1	
463	480V Sd Bd Rm 2A2 E1. 734			1	
465	Counting Room Ceiling E1. 690	2			
466	480V Sd Bd Rm 1B2 E1. 734				
467	480V Sd Bd Rm 1B2 E1. 734			1	
468	480V Sd Bd Rm 1B2 E1. 734			1	
469	480V Sd Bd Rm 2A2 E1. 734			1	
470	480V Sd Bd Rm 2A2 E1. 734			1	
471	480V Sd Bd Rm 2A2 E1. 734			1	
520	U1 AB General Supply Duct, El. 714		1		
521	U1 AB General Supply Duct, El. 714		1		
522	U2 AB General Supply Duct, El. 714		1		
523	U2 AB General Supply Duct, El. 714		1		
545	Hot Tool Rm. El. 669	4			
547	BAT Area Rm. A01, El. 690	2			
548	BAT Area Rm. A01, El. 690	2			
700	U1 Post Accident Sampling Facility El 706.0	1			
701	U1 Post Accident Sampling Facility El 706.0	1			

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
602	U2 Post Accident Sampling Facility El 706.0	1			
603	U2 Post Accident Sampling Facility El 706.0	1			

14.2 FIRE SUPPRESSION WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.11.1 The fire protection water supply system shall be OPERABLE with:

a. Two fire pumps, each with a capacity of 1648 gpm at 130 psid, with suction aligned to the water storage tanks, and discharge aligned to the distribution piping.

b. Two water storage tanks, each with a minimum contained volume of 300,000 gals, and

c. An OPERABLE flow path from the water storage tanks through distribution piping, sectionalizing control or isolation valves, up to but not including the first valve off the loop header that isolate:
   1. Spray and/or sprinkler systems required to be OPERABLE per Section 3.7.11.2
   2. Hose standpipes required to be OPERABLE per Section 3.7.11.4.

APPLICABILITY: At all times.

ACTION:

a. With one pump and/or one water storage tank INOPERABLE, restore the inoperable equipment to OPERABLE status within seven (7) days, or perform corrective actions / reportability reviews in accordance with site administrative procedures outlining the plans and procedures to be used to restore the inoperable equipment to OPERABLE status or to provide an alternate backup pump or supply.

b. With no fire pumps or no water storage tanks OPERABLE:

   1. Establish a backup fire protection water supply system within twenty-four (24) hours and perform corrective actions / reportability reviews in accordance with site administrative procedures.

   2. When ACTION 3.7.11.1.b.1 cannot be met, within one (1) hour action shall be initiated to place the unit(s) in:
      a. At least HOT STANDBY within the next six (6) hours,
      b. At least HOT SHUTDOWN within the following six (6) hours, and
      c. At least COLD SHUTDOWN within the subsequent twenty-four (24) hours.

      Where corrective measures are completed that permit operation under the ACTION requirements, the ACTION maybe taken in accordance with the specified time limits as measured from the time of failure to meet the Limiting Condition for Operation.

c. With the fire suppression water system INOPERABLE for reasons other than loss of fire pumps or water storage tanks:

   1. Enter the applicable LCO of Section 3.7.11.2 and/or 3.7.11.4 for those systems with no OPERABLE flow path available.

14.2 FIRE SUPPRESSION WATER SYSTEM

SURVEILLANCE REQUIREMENTS

4.7.11.1.1 The fire suppression water system shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying the contained water supply volume,

b. At least once per 31 days by starting the electric motor-driven pump and operating it for at least 15 minutes,

c. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path is in its correct position.

d. At least once per 12 months by cycling each testable valve in the flow path through at least one complete cycle of full travel.

e. At least once per 18 months by performing a system functional test which includes simulated automatic actuation of the system throughout its operating sequence, and:

1. Verifying that each fire pump develops at least 1648 gpm at a pump differential pressure head of 130 psig,

2. Cycling each valve in the flow path that is not testable during plant operation through at least one complete cycle of full travel, and

3. Verifying that each fire pump starts automatically to maintain Fire Protection Water System pressure.

f. At least once per 3 years by performing a flow test of the system in accordance with Chapter 5, Section 11 of the Fire Protection Handbook, 14th Edition, published by the National Fire Protection Association.

4.7.11.1.2 The diesel-driven fire pump system shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying:

1) The fuel storage tank contains at least 50% full volume,

2) The diesel starts from ambient conditions and operates for at least 30 minutes,

b. At least once per 92 days by verifying that a sample of diesel fuel from the fuel storage tank is within acceptable limits when checked for viscosity and water and sediment, and

c. At least once per 18 months by subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for the class of service.

4.7.11.1.3 The diesel-driven fire pump starting 24-volt battery bank and charger shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying that:

1) The electrolyte level if each battery is above the plates, and

2) The overall battery voltage is greater than or equal to 24 volts.

b. At least once per 92 days by verifying that the specific gravity is appropriate for continued service of the battery, and

c. At least once per 18 months by verifying that:

1) The batteries, cell plates, and battery racks show no visual indication of physical damage or abnormal deterioration, and

2) The battery-to-battery and terminal connections are clean, tight, free of corrosion, and coated with anticorrosion material.

14.3 SPRAY AND/OR SPRINKLER SYSTEMS

LIMITING CONDITION FOR OPERATION

3.7.11.2 The following spray and/or sprinkler systems shall be OPERABLE:

a. Reactor Building - RC pump area, Annulus

b. Auxiliary Building - Elev. 669, 690, 706, 714, 734, 749, 759, ABGTS Filters, EGTS Filters, Cont. Purge Filters, and 125V Battery Rooms.

c. Control Building - Elev. 669, Cable Spreading Room, MCR air filters, and operator living area.

d. Diesel Generator Building - Corridor Area.

e. Turbine Building - Control Building Wall.

APPLICABILITY: Whenever equipment protected by the spray/sprinkler system is required to be OPERABLE.

ACTION:

a. With one or more of the above required spray and/or sprinkler systems inoperable, within one hour, establish backup fire suppression.

b. Restore the system to OPERABLE status within fourteen (14) days. If not restored to OPERABLE within fourteen (14) days, perform corrective actions / reportablilty reviews in accordance with site administrative procedures.

SURVEILLANCE REQUIREMENTS

4.7.11.2 Each of the above required spray and/or sprinkler systems shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path, excluding those valves in the Reactor Buildings, is in its correct position.

b. At least once per 12 months by cycling each testable valve in the flow path through at least one complete cycle of full travel.

14.3 SPRAY AND/OR SPRINKLER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

c. At least once per 18 months:

1. By performing a system functional test which includes simulated automatic actuation of the system, and:

a) Verifying that the automatic valves in the flow path actuate to their correct positions on a cross zone or single zone detection test signal as designed, and

b) Cycling each valve in the flow path that is not testable during plant operation through at least one complete cycle of full travel.

c) Verifying that each valve (manual, power operated or automatic) in the flow path, located in the Reactor Buildings, is in its correct position.

2. By visual inspection of the dry pipe, spray and sprinkler headers to verify their integrity, and

3. By visual inspection of each nozzle's spray area to verify the spray pattern is not obstructed.

14.4 CO_2 SYSTEMS

LIMITING CONDITION FOR OPERATION

3.7.11.3 The following low pressure CO2 systems shall be OPERABLE.

a. Computer Room.

b. Auxiliary Instrument Room.

c. Diesel Generator Rooms.

d. Fuel Oil Pump Rooms.

e. Diesel Generator Building Electrical Board Rooms.

APPLICABILITY: Whenever equipment protected by the CO_2 systems is required to be OPERABLE.

ACTION:

a. With one or more of the above required CO_2 systems inoperable, within one hour, establish backup fire suppression.

b. Restore the system to OPERABLE status within fourteen (14) days. If not restored to OPERABLE within fourteen (14) days, perform corrective actions / reportablilty reviews in accordance with site administrative procedures.

SURVEILLANCE REQUIREMENTS

4.7.11.3.1 Each of the above required CO_2 systems shall be demonstrated OPERABLE at least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path is in its correct position.

4.7.11.3.2 Each of the above required low pressure CO_2 systems shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying the CO_2 storage tank level to be greater than 50% and pressure to be greater than 270 psig, and

b. At least once per 18 months by verifying:

1. The system valves and associated ventilation dampers and fire door release mechanisms actuate manually and automatically, upon receipt of a simulated actuation signal, and

2. Flow from each nozzle during a "Puff Test."

14.5 FIRE HOSE STATIONS

LIMITING CONDITION FOR OPERATION

3.7.11.4 The fire hose stations shown in Table 3.7-5 shall be OPERABLE.

APPLICABILITY: Whenever equipment in the areas protected by the fire hose stations is required to be OPERABLE.

ACTION:

a. With one or more of the fire hose stations shown in Table 3.7-5 inoperable, route an additional equivalent capacity fire hose to the unprotected area(s) from an OPERABLE hose station within one (1) hour if the inoperable fire hose is the primary means of fire suppression; otherwise route the additional hose within twenty-four (24) hours. Fire hoses for the hose stations shown in Sections (a) - (d) of Table 3.7-5 shall be attached by the Fire Brigade as needed, and are not required to be permanently installed at the hose stations. For all hose stations shown in Table 3.7-5, restore the inoperable fire hose station(s) to OPERABLE status within fourteen (14) days. If not restored to OPERABLE within fourteen (14) days, perform corrective actions / reportablilty reviews in accordance with site administrative procedures.

SURVEILLANCE REQUIREMENTS

4.7.11.4 Each of the fire hose stations shown in Table 3.7-5 shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve in the flow path, excluding those valves located in the Reactor Building, is in its correct position.
b. At least once per 92 days by visual inspection of the stations accessible during plant operations, excluding those stations located in the Reactor Buildings, to assure all required equipment is at the station.
c. At least once per 12 months by cycling each testable valve in the flow path, excluding those valves located in the Reactor Buildings, through at least one complete cycle of full travel.
d. At least once per 18 months by:
    1. Visual inspection of the stations located in the Reactor Buildings to assure all required equipment is at the station,
    2. Removing the hose for inspection and re-racking,
    3. Inspecting all gaskets and replacing any degraded gaskets in the couplings,
    4. Verifying that each valve in the flow path, located in the Reactor Buildings, is in its correct position,
    5. Cycling each valve in the flow path, that is inaccessible during normal plant operation and is located in the Reactor Buildings, through at least one complete cycle of full travel.
    6. Verifying that the automatic valves in the flow path actuate to their correct positions, as designed.
e. At least once per 3 years by:
    1. Partially opening each hose station valve to verify valve OPERABILITY and no flow blockage.
    2. Conducting a hose hydrostatic test at a pressure of 150 psig or at least 50 psig above maximum fire main operating pressure, whichever is greater.

LOCATION	ELEVATION	HOSE RACK#
a. Unit 1 Reactor Building - Annulus Area		
Platform	778.5	1-26-1196
Platform	778.5	1-26-1197
Platform	778.5	1-26-1198
Platform	778.5	1-26-1199
Platform	759.5	1-26-1200
Platform	759.5	1-26-1201
Platform	759.5	1-26-1202
Platform	759.5	1-26-1203
Platform	740.5	1-26-1204
Platform	740.5	1-26-1205
Platform	740.5	1-26-1206
Platform	740.5	1-26-1207
Platform	721.5	1-26-1208
Platform	721.5	1-26-1209
Platform	721.5	1-26-1210
Platform	721.5	1-26-1211
Platform	701.5	1-26-1212
Platform	701.5	1-26-1213
Platform	701.5	1-26-1214
Platform	701.5	1-26-1215
Platform	679.78	1-26-1216
Platform	679.78	1-26-1217
Platform	679.78	1-26-1218
Platform	679.78	1-26-1219
b. Unit 1 Reactor Building - RCP & Lower Containment Air Filters Area		
Reactor Building	679.78	1-26-1220
Reactor Building	679.78	1-26-1221
Reactor Building	679.78	1-26-1222
Reactor Building	679.78	1-26-1223
Reactor Building	679.78	1-26-1224
Reactor Building	679.78	1-26-1225

LOCATION	ELEVATION	HOSE RACK#
c. Unit 2 Reactor Building - Annulus Area		
Platform	778.0	2-26-1196
Platform	778.0	2-26-1197
Platform	778.0	2-26-1198
Platform	778.0	2-26-1199
Platform	759.0	2-26-1200
Platform	759.0	2-26-1201
Platform	759.0	2-26-1202
Platform	759.0	2-26-1203
Platform	740.0	2-26-1204
Platform	740.0	2-26-1205
Platform	740.0	2-26-1206
Platform	740.0	2-26-1207
Platform	721.0	2-26-1208
Platform	721.0	2-26-1209
Platform	721.0	2-26-1210
Platform	721.0	2-26-1211
Platform	701.0	2-26-1212
Platform	701.0	2-26-1213
Platform	701.0	2-26-1214
Platform	701.0	2-26-1215
Platform	679.78	2-26-1216
Platform	679.78	2-26-1217
Platform	679.78	2-26-1218
Platform	679.78	2-26-1219
d. Unit 2 Reactor Building - RCP & Lower Containment Air Filters Area		
Reactor Building	679.78	2-26-1220
Reactor Building	679.78	2-26-1221
Reactor Building	679.78	2-26-1222
Reactor Building	679.78	2-26-1223
Reactor Building	679.78	2-26-1224
Reactor Building	679.78	2-26-1225

LOCATION	ELEVATION	HOSE RACK#
e. Control Building		
Control Building	732	0-26-1186
Control Building	732	0-26-1191
Control Building	706	0-26-1187
Control Building	706	0-26-1192
Control Building	685	0-26-1188
Control Building	685	0-26-1193
Control Building	669	0-26-1189
Control Building	669	0-26-1194
f. Diesel Generator Building		
Corridor	722	0-26-1077
Corridor	740.5	0-26-1080
Air Exhaust Rm.	740.5	0-26-1082
Lube Oil Storage Room 722.0-2	722	0-26-2337
g. Additional Equipment Building - Unit 1		
South Wall	740.5	1-26-687
South Wall	706	1-26-686
h. Additional Equipment Building - Unit 2		
North Wall	740.5	2-26-687
North Wall	706	2-26-686

LOCATION	ELEVATION	HOSE RACK#
i. Auxiliary Building		
	759	1-26-669
	759	2-26-669
	749	2-26-664
	749	1-26-664
	734	2-26-670
	734	0-26-684
	734	1-26-670
	734	0-26-682
	734 Siamese Outlet	1-26-671 and 1-26-672
	734 Siamese Outlet	2-26-671 and 2-26-672
	734	1-26-665
	734	2-26-665
	714	0-26-660
	714	1-26-666
	714	2-26-666
	714	0-26-677
	706	0-26-658
	690	0-26-690
	690	0-26-661
	690 Siamese Outlet	1-26-674 and 1-26-675
	690 Siamese Outlet	2-26-674 and 2-26-675
	690	1-26-667
	669	2-26-667
	669	1-26-668
	669	2-26-668
	669	0-26-662
	669	0-26-680
	653	0-26-663
	653	0-26-691
j. CCW Intake Pumping Station		
	690	0-26-866
	690	0-26-867
	690	0-26-868
	690	0-26-869
	690	0-26-870

LOCATION	ELEVATION	HOSE RACK#
k. ERCW Pumping Station		
	688	0-26-927
	688	0-26-926
	688	0-26-930
	704	0-26-931
	704	0-26-925
	704	0-26-928
	720	0-26-929
	720	0-26-924
	720	0-26-932

14.6 FIRE BARRIER PENETRATIONS

LIMITING CONDITION FOR OPERATION

3.7.12 All fire barrier penetrations (including cable penetration barriers, fire doors and fire dampers) in fire zone boundaries protecting safety related areas shall be functional.

APPLICABILITY: At all times.

ACTION:

NOTE: For ERFBS (e.g., Thermo-Lag, Kaowool, etc.) an hourly roving fire watch with OPERABLE detection in the affected area, or continuous fire watch with no OPERABLE detection in the affected area shall be maintained until upgrade work is complete as described in DCN's M-12743 & M-12744 (Thermo-Lag upgrade), and M-12745 & M-12746 (Kaowool replacement).

a. With one or more of the required fire barrier penetrations non-functional, within one hour restore the inoperable equipment or:

1. Establish a continuous fire watch on at least one side of the affected barrier, where there is NO OPERABLE fire detection on either side of the affected barrier, or
2. Verify the OPERABILITY of fire detection on one side of the non-functional fire barrier and establish an hourly fire watch, or
3. If fire detection is OPERABLE on both sides of the effected barrier, then no compensatory actions are required.

b. Restore the non-functional fire barrier penetration(s) to functional status within 30 days. If not restored to OPERABLE within thirty (30) days, perform a review in accordance with the site corrective action procedures.

SURVEILLANCE REQUIREMENTS

4.7.12 Each of the above required fire barrier penetrations shall be verified to be functional:

a. At least once per 18 months by a visual inspection

b. Prior to returning a fire barrier penetration to functional status following repairs or maintenance by performance of a visual inspection of the affected fire barrier penetration(s).

14.7 EMERGENCY BATTERY LIGHTING UNITS

LIMITING CONDITION FOR OPERATION

3.7.14 Emergency battery lighting units provided for FSSD shall be OPERABLE.

APPLICABILITY: Modes 1, 2, 3 or 4 on the Unit with the illuminated FSSD equipment required to be OPERABLE.

ACTION:

a. With any of the emergency battery lighting units provided for FSSD Inoperable, restore the Inoperable units to Operable status within 24 hours, or ensure alternate lighting is available.

b. Restore the Inoperable emergency battery lighting unit to Operable status within 14 days. If not restored to OPERABLE within 14 days, perform a review in accordance with site corrective action programs.

SURVEILLANCE REQUIREMENTS

4.7.14 Each of the above required emergency battery lighting units (EBL) shall be verified to be functional:

a. At least once per 92 days by performing a functional test and visual inspection of each EBL to verify proper operation and correct alignment of the lamps of the EBL as a unit by simulating a loss of power.

b. Periodically replace batteries as a function of their service life, environmental condition and as a safety factor.

BASES

14.1 FIRE DETECTION INSTRUMENTATION

OPERABILITY of the fire detection instrumentation ensures that adequate warning capability is available for the prompt detection of fires. This capability is required in order to detect and locate fires in their early stages. Prompt detection of fires will reduce the potential for damage to safety related equipment and is an integral element in the overall facility fire protection program.

The fire detection system provides the ability to detect and alarm to a constantly attended location the presence of a fire, and in some instances to automatically actuate automatic fire suppression equipment. If the alarm function of the fire detection system is INOPERABLE, fire watches are required to be established to monitor the affected areas for fire conditions since this is the only means available to provide for detection and notification. If the automatic actuation of fire suppression equipment is INOPERABLE but the alarm function of the system remains OPERABLE it is appropriate to enter the LCO for INOPERABLE automatic suppression and provide a back up means of fire suppression. Fire watches are not specified in this case since the ability of the fire detection system to detect and alarm to a constantly attended location remains OPERABLE. If both the alarm function and the automatic actuation function of the system is INOPERABLE it is necessary to establish fire watches in accordance with the requirements of section 3.3.3.8 and to enter the applicable requirements of LCO 3.7.11.2 and/or LCO 3.7.11.3 and provide a back up means of fire suppression.

In cases where the fire detection alarm and notification function is INOPERABLE to a constantly attended location but remains OPERABLE at the local fire detection panels it is appropriate to establish the required fire watch compensatory measures either at the local fire detection panels or in the actual areas protected. In cases where the fire detection alarm and notification function is INOPERABLE at the local fire detection panel the required fire watch compensatory measures must be established in the areas protected.

Output from the fire detection system also provide for the automatic shutdown of selected plant fans/air movers and dampers. This output is beyond the scope of this LCO for the fire detection system since this automatic shutdown does not affect the operations of the system as exhibited by the annunciation of the associated fire detection equipment.

In the event that a portion of the fire detection instrumentation is inoperable, the establishment of continuous or roving fire patrols in the affected areas is required to provide detection capability until the inoperable instrumentation is restored to OPERABILITY. The fire watch requirements for inoperable attendant fire detection equipment are for a continuous fire watch in areas where redundant systems or components could be damaged and an hourly fire watch in areas where redundant systems or components could not be damaged. An hourly roving fire watch is required for inoperable detection equipment that is alarm only, and does not have associated automatic suppression equipment.

The compensatory actions described in LCO 3.3.3.8 for loss of detection inside containment differ from those for other areas due to radiological conditions and potential hazards. Alternative compensatory actions have been established for these cases, and consist of either inspecting the area at least once every eight hours, or hourly air temperature monitoring at the locations specified in the ACTION statement of LCO 3.3.3.8. The one hour frequency for air temperature monitoring is considered adequate, based on restricted access to

Containment, and other indicators available in the Main Control Room (MCR), including alarms to alert the operator to abnormal containment temperature conditions.

The surveillance requirements provide assurance that the minimum OPERABILITY requirements of the fire detection instrumentation are met. All hourly fire watch patrols require that a trained individual be in the specified area at intervals of 60 minutes with a margin of 15 minutes.

A continuous fire watch requires that a trained individual be in the specified area at all times, that the specified area contain no impediment to restrict the movements of the continuous fire watch, and that each compartment within the specified area is patrolled at least once every 15 minutes with a margin of 5 minutes. A specified area for a continuous fire watch is one or more fire zones within a single fire area, which are easily accessible to each other and can be patrolled within 15 minutes. Easy access is defined as: no locked doors or inoperable card reader, no C-Zone entry required, or no hazards that will interfere with the continuous fire watch activity being performed within the 15-minute period.

The restoration time of 14 days is reasonable based on the compensatory actions required for inoperable equipment. During unit outages it will sometimes be necessary to remove equipment from service for longer than 14 days to support outage related activities. These impairments will be excluded from the corrective action program review requirements for exceeding the 14 day restoration time during unit outages. The Fire Protection Unit (FPU) will review all impairments and document the justification for extension past the 14 day restoration time when necessary to support unit outage activities. All other requirements associated with the ACTION statements of 3.3.3.8 shall remain applicable.

BASES

14.2, 14.3, 14.4, 14.5 FIRE SUPPRESSION SYSTEMS

The OPERABILITY of the fire suppression systems ensures that adequate fire suppression capability is available to confine and extinguish fires occurring in any portion of the facility where safety related equipment is located. The fire suppression system consists of the water system, spray and/or sprinklers, CO_2, and fire hose stations. The collective capability of the fire suppression systems is adequate to minimize potential damage to safety related equipment and is a major element in the facility fire protection program.

The fire protection water supply system consists of water storage tanks, pumps, and the necessary piping and valves to provide a flow path from the pumps to the end devices which consist of sprinkler/spray systems and hose standpipe systems. The water distribution system is looped to provide redundancy of the flow path. The closing of a single valve on the looped distribution piping will not cause the end device(s) to become inoperable. The closing of multiple valves in the looped distribution piping can completely isolate or degrade the flow path to the sprinkler/spray systems and the hose standpipe systems. When this situation occurs it is appropriate to enter the applicable LCO and comply with the action statement for the system(s) that is made inoperable by the condition.

In the event that portions of the fire suppression systems are inoperable, alternate backup fire fighting equipment is required to be made available in the affected areas until the inoperable equipment is restored to service. When the inoperable fire fighting equipment is intended for use as a backup means of fire suppression, a longer period of time is allowed to provide an alternate means of fire fighting than if the inoperable equipment is the primary means of fire suppression.

The surveillance requirements provide assurance that the minimum OPERABILITY requirements of the fire suppression systems are met. For fire suppression equipment located in the Reactor Buildings, the surveillance frequency of once per 18 months (refueling outage) is supported by the limited accessibility of this equipment, historical data from previous performances, ALARA and Industrial Safety concerns and is considered adequate.

In the event the fire suppression water system described by 3.7.11.1 becomes inoperable, immediate corrective measures must be taken since this system provides the major fire suppression capability of the plant. Reportability reviews/corrective actions performed in accordance with administrative procedures provides for prompt evaluation of the corrective measurers to ensure adequate fire suppression capability for the continued protection of the nuclear plant.

The restoration time of 14 days described by 3.7.11.2, 3.7.11.3, and 3.7.11.4 is reasonable based on the compensatory actions required for inoperable equipment. During unit outages it will sometimes be necessary to remove equipment from service for longer than 14 days to support outage related activities. These impairments will be excluded from the corrective action program review requirements for exceeding the 14 day restoration time during unit outages. The Fire Protection Unit (FPU) will review all impairments and document the justification for extension past the 14 day restoration time when necessary to support unit outage activities. All other requirements associated with the ACTION statements of 3.7.11.2, 3.7.11.3, and 3.7.11.4 shall remain applicable.

All hourly fire watch patrols require that a trained individual be in the specified area at intervals of 60 minutes with a margin of 15 minutes.

A continuous fire watch requires that a trained individual be in the specified area at all times, that the specified area contain no impediment to restrict the movements of the continuous fire watch, and that each compartment within the specified area is patrolled at least once every 15 minutes with a margin of 5 minutes.

A specified area for a continuous fire watch is one or more fire zones within a single fire area, which are easily accessible to each other and can be patrolled within 15 minutes. Easy access is defined as: no locked doors or inoperable card reader, no C-Zone entry required, or no hazards that will interfere with the continuous fire watch activity being performed within the 15-minute period.

Fire hoses in the Annulus and Containment areas for both units (Sections (a) - (d) of Table 3.7-5) are not required to be permanently installed at the hose stations. Surveillance Requirement 4.7.11.4 ensures that all equipment associated with the hose stations is operable. If necessary, Fire Brigade members can connect hoses to the hose stations connections using portable hose packs. Since plant personnel not specifically trained for fire fighting situations are instructed to immediately evacuate an area in which a fire occurs, and are not expected or desired to perform fire fighting activities, the absence of the hoses on the racks does not delay fire fighting measures. The removal of hoses from the Containment and Annulus areas is a good ALARA practice, since the hoses do not have to be removed and replaced every refueling outage, as well as a cost-effective measure due to expenses from contaminated waste removal, and costs due to equipment replacement.

BASES

14.6 FIRE BARRIER PENETRATIONS

The functional integrity of the fire barrier penetrations ensures that fires will be confined or adequately retarded from spreading to adjacent portions of the facility. This design feature minimizes the possibility of a single fire rapidly involving several areas of the facility prior to detection and extinguishment. The fire barrier penetrations are a passive element in the facility fire protection program and are subject to periodic inspections.

Fire barrier penetrations, including cable penetration barriers, fire doors and dampers are considered functional when the visually observed condition is the same as the as-designed condition. For those fire barrier penetrations that are not in the as-designed condition, an evaluation shall be performed to show that the modification has not degraded the fire rating of the fire barrier penetration.

During periods of time when a barrier is not functional, either: 1) A continuous fire watch is required to be maintained in the vicinity of the affected barrier (if there is NO OPERABLE detection on either side of the affected barrier); or 2) The fire detectors on one side of the affected barrier must be verified OPERABLE and a hourly fire watch patrol established, until the barrier is restored to functional status. In cases where there is OPERABLE detection on both sides of the affected barrier, no fire watch is required. A fire watch is required for detection and notification of a fire to ensure early response, and with operable detection on both sides of an affected barrier, the placement of fire watches provides no additional fire protection function.

For ERFBS (e.g., Thermo-Lag, Kaowool, etc.) an hourly roving fire watch with OPERABLE detection in the affected area, or continuous fire watch with no OPERABLE detection in the affected area shall be maintained until upgrade work is complete as described in DCN's M-12743 & M-12744 (Thermo-Lag upgrade), and M-12745 & M-12746 (Kaowool replacement).

All hourly fire watch patrols require that a trained individual be in the specified area at intervals of 60 minutes with a margin of 15 minutes.

A continuous fire watch requires that a trained individual be in the specified area at all times, that the specified area contain no impediment to restrict the movements of the continuous fire watch, and that each compartment within the specified area is patrolled at least once every 15 minutes with a margin of 5 minutes.

A specified area for a continuous fire watch is one or more fire zones within a single fire area, which are easily accessible to each other and can be patrolled within 15 minutes. Easy access is defined as: no locked doors or inoperable card reader, no C-Zone entry required, or no hazards that will interfere with the continuous fire watch activity being performed within the 15-minute period.

BASES

14.6 FIRE BARRIER PENETRATIONS (cont.)

The completion time of 30 days affords adequate time for the various cure times for the different fire barrier materials, procedural requirements for time between stages when multiple stages of installation are required, and inspection and/or testing of the barrier materials. This completion time is reasonable, based on the compensatory actions for continuous fire watches, or those pertaining to fire-rated assemblies/fire barriers used in conjunction with other fire protection features, such as fire detection.

The completion time of 30 days affords adequate time for the various cure times for the different fire barrier materials, procedural requirements for time between stages when multiple stages of installation are required, and inspection and/or testing of the barrier materials. This completion time is reasonable, based on the compensatory actions for continuous fire watches, or those pertaining to fire-rated assemblies/fire barriers used in conjunction with other fire protection features, such as fire detection.

During unit outages it will sometimes be necessary to breach some of the fire barriers for longer than 30 days for plant personnel and equipment access purposes. These breaches will be excluded from the corrective action program review requirements for exceeding the 30 day restoration time during unit outages. The Fire Protection Unit (FPU) will review all breached fire barriers and document the justification for extension past the 30 day restoration time when necessary to support unit outage activities. All other requirements associated with the ACTION statements of 3.7.12 shall remain applicable.

BASES

14.7 EMERGENCY BATTERY LIGHTING UNITS

Emergency battery lighting (EBL) units are required to support a unit shutdown in the event of a fire and coincident loss of offsite power.

An ability to access and operate fire safe shutdown systems is required as well as the protection of such systems. These tasks must be capable of being performed in conjunction with the loss of offsite power. To achieve this, emergency battery lighting units with 8 hour lighting capacity are provided.

FOR 3.7.14 uses the term "alternate battery lighting" for a temporary substitute for installed emergency battery lighting units. This "alternate battery lighting" generally refers to portable, hand-held lighting as addressed in Part V, Section 2.0, "Emergency Lighting" of this report.

The restoration of the equipment to OPERABLE status in 14 days is reasonable based on the type of equipment that is out of service.

The Surveillance Requirements (SR) verify proper operation of EBL units by simulating a loss of power. When manually actuated, normal AC power is interrupted to the EBL at the primary or secondary side of the step-down transformer. Thus, the EBL's ability to go from the float charge mode to the discharge mode is fully exercised. This functional test also demonstrates:

1) The EBL is configured for automatic operation and is not in the standby mode
2) The load transfer circuitry is functional
3) The lamps are functional
4) Continuity exists between the battery and all lamps
5) The battery is functional
6) The charging circuit is functional
7) The status indicators are functional

A visual inspection to assess the general condition of the EBL, to detect obvious signs of degradation, and to detect any damage to the unit that may affect Operability is included. The visual inspection can identify degradation mechanisms at an early stage, and in many cases, can warn personnel of an impending failure. Included is a visual inspection to identify electrolyte leakage, and for vented cells, to determine whether water addition is needed. Early detection of battery leakage allows battery replacement before the leakage results in complete battery failure or in severe damage to other EBL components. The inspection verifies proper alignment of the lamps (or in the case of multiple components the capability to be aligned) to ensure illumination of the fire safe shutdown equipment and/or access/egress paths.

The frequency of 92 days for EBLs is based upon vendor recommendations and industry practice.

The SR requires periodic battery replacement as a function of its service life, environmental conditions the battery will experience, and as a safety factor. The service life and the environmental factors are based on information from the manufacturer. This manufacturer's information plus the safety factor results in the frequencies as shown below:

Type of Battery	Service Life (Years)	Replacement Frequency
Sealed lead acid and calcium alloy	15	8
Solid gel	4	3

The replacement method is preferred since a periodic, deep discharge (8 hour) test is not recommended by the manufacturer. The frequency and criteria is based on vendor recommendations.

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(All drawings will be current active version)

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Figure II-4	1,2-47W850-4	Flow Diagram Transformer Fire Protection System
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Figure II-12	1,2-47W832-1	Flow Diagram Raw Service Water Cooling and Fire Protection
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Figure II-17	1,2-47W610-26-1	Mechanical Control Diagram High Pressure Fire Protection System
Figure II-18	1,2-47W610-26-2	Mechanical Control Diagram High Pressure Fire Protection System
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Figure II-20	1,2-47W611-26-2	Mechanical Logic Diagram High Pressure Fire Protection

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FPR Figure #	TVA Drawing	Title
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Figure II-23	1,2-47W611-39-1	Logic Diagram CO2 Storage, Fire Protection Purging System
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Figure II-25	1,2-47W611-13-1	Mechanical Logic Diagram Fire Detection System
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Figure II-35	1,2-47W600-248	Mechanical Instruments and Controls
Figure II-36	1,2-47W600-249	Mechanical Instruments and Controls
Figure II-37	1,2-47W600-250	Mechanical Instruments and Controls
Figure II-38	1,2-47W600-251	Mechanical Instruments and Controls
Figure II-39	1,2-47W600-252	Mechanical Instruments and Controls
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(Continued)

FPR Figure #	TVA Drawing	Title
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Figure II-46	1,2-47W600-259	Mechanical Instruments and Controls
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(* Changes are to Figure Numbers Only)

1.0 INTRODUCTION

This part documents the methodology used to satisfy 10CFR50 Appendix R Section III.J & III.0.

III.J requires emergency lighting units with at least an 8-hour battery power supply in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto.

Section III.0 requires the reactor coolant pump to be equipped with an oil collection system if the containment is not inerted during normal operation.

2 .0 EMERGENCY LIGHTING

Emergency lighting units with at least an 8-hour battery power supply are provided in areas needed for operation of safe shutdown equipment and in access and egress routes as required by 10CFR50 Appendix R, Section III.J. Emergency lighting is provided for Appendix R fire scenarios that require manual operator actions (ref. 4.1.1) within the first 8 hours in order to ensure safe shutdown capability. Portable lanterns are also available for performance of manual actions (ref. 4.1.2) and in the event access is required to remote areas of the site (e.g. yard, DGB, ERCW pumping station, Reactor Building). Additionally, although cable separation analysis has not been included in the safe shutdown analysis, permanently installed standby lighting powered by the shutdown boards (LS lighting cabinets) and emergency lighting powered by vital batteries (LD lighting cabinets) will contribute to the lighting levels in the plant. The DGB has lighting provided by lighting cabinets that are three hour separated. The security system provides lighting for the yard areas.

Plant walkdowns have been conducted to assess the adequacy of the 8 hour emergency lighting units in access/egress routes to manual action locations in the plant and at the manual action locations. The adequacy of this emergency lighting was evaluated by fire protection engineers and/or plant operators who would be responsible for performing the manual actions during an Appendix R event (ref. 4.1.3). Walkdown checklists for the emergency lighting units provided for manual action locations and access/egress routes were performed (ref. 4.1.4). Additional lighting units were added and existing units modified/adjusted to achieve additional lighting (ref. 4.1.5).

Functional tests are specified by the Surveillance Requirements (Part II, Section 14.7) and are detailed in approved instructions (ref. 4.1.6), which are performed on the emergency battery lighting units by simulating a loss of power. FOR 3.7.14, SR 4.7.14 and the Bases for Section 14.7 of Part II of the FPR provide the operating and surveillance requirements, and the technical bases for those requirements.

Emergency lighting units with 8-hr battery supply are provided with unique identification numbers in the locations listed in Table V-1. The illuminated components and/or areas are also listed.

3.0 REACTOR COOLANT PUMP OIL COLLECTION

The reactor coolant pumps (RCPs) are equipped with an oil collection system. The oil collection system is designed, engineered, and installed such that failure of oil containing components on the RCPs will not lead to fire during normal or design basis accident conditions. Additionally, there is reasonable assurance that the system will with-stand the Safe Shutdown Earthquake.

The oil collection system is capable of collecting lube oil from all potential pressurized and unpressurized leakage sites in the reactor coolant pump lube oil system. The oil leakage is safely collected and drained to a vented closed sump.

The drain piping located between the oil collection basins (around the pump) and the containment floor (oil drains to the auxiliary reactor building sump), is designed to category I (L) requirements so the piping will not fail during a safe shutdown earthquake and damage nuclear safety-related equipment. The drain piping has not been designed to maintain its pressure boundary integrity after the event. The RCP lubricating oil system, and the auxiliary reactor building sump are designed to seismic category I requirements so they will not fail during a safe shutdown earthquake (ref. 4.1.7). The total system provides more than reasonable assurance that a RCP lubricating oil fire will not occur as a result of a seismic event.

The RCP oil collection system does not have the capacity to hold the entire contents from all four RCP lubricating oil systems. The reactor coolant pump motors, the lubricating oil systems, and the auxiliary reactor building (pocket) sump are all designed to seismic category I requirements so they will not fail during a safe shutdown earthquake. Therefore, assuming only a single random failure, the oil collection system would only be required to hold the oil resulting from the largest spill due to such a single failure. The largest single failure is the rupture of the upper bearing oil system of one RCP, which contains 240 gallons of oil. The auxiliary reactor building sump holds approximately 200 gallons. Additional storage capacity of 140 gallons is available in the embedded piping systems for a total of 340 gallons of capacity (ref. 4.1.8). Annunciator response instructions require the operator to pump the auxiliary reactor building sump down in the event of a RCP high/low oil reservoir alarm in order to ensure adequate capacity is available for oil collection (4.1.9).

The sump vents do not require the installation of flame arresters because the high flashpoint characteristics of the reactor coolant pump lube oil preclude the hazard of fire flashback.

Refer to Part VII of this FPR for deviations to Section III.0.

4.0 REFERENCES

4.1 TVA Documents

4.1.1 SQN-SQS4-0127, "Equipment Required for Safe Shutdown per 10CFR50 Appendix R"

4.1.2 AOP-C.04, "Control Room Inaccessibility"

4.1.3 Appendix R Project Documentation of Emergency Lighting: S01 85906 823, S01 851223 916, S01 860214 805, S53 850822 916, S01 850517 892, S01 850424 819, S01 860507 949

4.1.4 Memo from R. S. Egli to I. M. Heatherly, dated May 9, 1994, "Walkdown of Emergency Lighting Required for Appendix R Fire Safe Shutdown Manual Actions", (B38 940509 800)

4.1.5 Modifications to Add Additional Appendix R Lights: ECN L5984, ECN L6287, DCN M00558D, DCN M09611B, DCN F10041A, DCN F11358A, DCN F12153A, and DCN M12538A for the aiming and remote locating of 10 lamps. Note: DCN M12538A is not complete.

4.1.6 MI-10.56, "Emergency Lighting (Appendix R)"

4.1.7 Design Criteria, DC-V-3.0, "The Classification of Piping, Pumps, Valves, and Vessels."

4.1.8 Memo from J. H. Sullivan to Appendix R Project Files, "RCP Oil Collection System", S01 841206 919

4.1.9 1- & 2-AR-M5-B, "Annunciator Response"

TABLE V-1, 8 HOUR EMERGENCY LIGHTING UNITS

COMP. ID	DESCRIPTION	ILLUMINATED COMPONENTS
0-LGT-247-R001	749.0, Stair #8	Up/Dn Stairs & Doors
0-LGT-247-R002	749.0, A3/r-s	RX MOV BD 1B1-B, 1B2-B, Vital Battery Charger I and its Transfer switch, Inverters 1-I and 2-I
0-LGT-247-R003	749.0, A8/s	Vital Battery Charger II and its Transfer switch, Spare Charger 1-S and its Transfer switches, Inverters 1-II and 2-II
0-LGT-247-R004	749.0, A8/s	Vital Battery Charger III and its Transfer switch, Spare Charger 2-S and its Transfer switches, Inverters 1-III and 2-III
0-LGT-247-R005	749.0, A13/r-s	RX MOV BD 2B1-B, 2B2-B, Vital Battery Charger IV and its Transfer switch, Inverters 1-IV and 2-IV
0-LGT-247-R006	749.0, Stair #7	Up/Dn Stairs & Doors
0-LGT-247-R007	749.0, A13/s-t	RX MOV BD 2A1-A, 2A2-A
0-LGT-47-R008	749.0, A8/s-t	General Area
0-LGT-247-R009	749.0, A8/s-t	General Area
0-LGT-247-R010	749.0, A3/s-t	RX MOV BD 1A1-A, 1A2-A
0-LGT-247-R011	749.0, A14/q	2A-A Exh Fan Dampers
0-LGT-247-R012	749.0, A14/s	2A-A Exh Fan Dampers
0-LGT-247-R013	749.0, A14/t	2B-B Exh Fan Dampers
0-LGT-247-R014	749.0, A14/u	2B-B Exh Fan Dampers
0-LGT-247-R015	759.0, A12/v	Stair S3
0-LGT-247-R016	759.0, A12/w	CRDM MG SET BKR A & B
0-LGT-247-R017	759.0, Stair #9	Up/Dn Stairs & Doors
0-LGT-247-R018	759.0, A4/v	CRDM MG SET BKR A & B, General Area
0-LGT-247-R019	759.0, A4/w	CRDM MG SET BKR A & B, General Area

COMP. ID	DESCRIPTION	ILLUMINATED COMPONENTS
0-LGT-247-R020	732.0, C2/n	General Area, Chiller Package B, TCV-67-201
0-LGT-247-R021	732.0, Stair C1	Up/Dn Stairs & Doors
0-LGT-247-R022	732.0, C4/p	General Area, PNL 1-M-9 Req by OPS
0-LGT-247-R023	732.0, C5/n	Req By OPS, PNL 1-M-3
0-LGT-247-R024	732.0, C5/n	Req By OPS, PNL-1-M-2
0-LGT-247-R025	732.0, C6/n	Req By OPS, PNL 1-M-1
0-LGT-247-R026	732.0, C6/n	Up/Dn Corridor
0-LGT-247-R027	732.0, C7/n	Req By OPS, PNL-0-M-12
0-LGT-247-R028	732.0, C7/n	OPS Req, MID MCR Desk
0-LGT-247-R029	732.0, C8/n	Up/Dn Corridor
0-LGT-247-R030	732.0, C8/n	Req by OPS, PNL 2-M-6
0-LGT-247-R031	732.0, C8/n	Req by OPS, PNL 2-M-6
0-LGT-247-R032	732.0, C9/n	Req by OPS, PNL 2-M-5
0-LGT-247-R033	732.0, C10/n-p	General Area, PNL 2-M-9 Req by OPS
0-LGT-247-R034	732.0, C9/q	OPS Req, PNL 2-M-1 & 2 -M-2
0-LGT-247-R035	732.0, C8/q	General Area
0-LGT-247-R036	732.0, C7/q	Req by OPS, PNL 2-M-1
0-LGT-247-R037	732.0, C6/q	Req by OPS, PNL 1-M-6
0-LGT-247-R038	732.0, C6/q	General Area
0-LGT-247-R039	732.0, C5/q	OPS Req, PNL 1-M-5 & 1-M-6
0-LGT-247-R040	732.0, Stair C2	Up/Dn Stairs & Doors
0-LGT-247-R041	732.0, C11/n-p	Corridor, Doors C51 & C60
0-LGT-247-R042	732.0, C13/n	General Area
0-LGT-247-R043	732.0, C13/p	General Area
0-LGT-247-R044	732.0, C2/p-q	0-FC0-31A-20,-23,-176,-177

TABLE V-1, 8 HOUR EMERGENCY LIGHTING UNITS

COMP. ID	DESCRIPTION	ILLUMINATED COMPONENTS
0-LGT-247-R045	732.0, C4/n	Corridor, DRS C56 & C39
0-LGT-247-R046	734.0, A12/q-r	General Area
0-LGT-247-R047	734.0, A13s	6.9kV SD BD 1B-B, 2B-B
0-LGT-247-R048	734.0, A14/q	480V SD BD 2A2-A
0-LGT-247-R049	734.0, A14/r	480V SD BD 2A1-A
0-LGT-247-R050	734.0, A14/t	480V SD BD 2B1-B
0-LGT-247-R051	734.0, A15/u	2-PCV-1-5 Handwheel
0-LGT-247-R052	734.0, A13/s-t	480V SD BD 2B2-B
0-LGT-247-R053	734.0, A12/u	General Area
0-LGT-247-R054	734.0, A11/s	6.9kV SD BD 1B-B, 2B-B
0-LGT-247-R055	734.0, A10/s	6.9kV SD BD 1B-B, 2B-B
0-LGT-247-R056	734.0, A11/r	General Area
0-LGT-247-R057	734.0, A8/r	General Area
0-LGT-247-R058	734.0, A8/q	General Area
0-LGT-247-R059	734.0, A5/r	General Area
0-LGT-247-R060	734.0, A6/s	6.9kV SD BD 1A-A, 2A-A
0-LGT-247-R061	734.0, A5/s	6.9kV SD BD 1A-A, 2A-A
0-LGT-247-R062	734.0, A3/s	6.9kV SD BD 1A-A, 2A-A
0-LGT-247-R063	734.0, A3/q	480V SD BD 1B2-B
0-LGT-247-R064	734.0, A2/r	480V SD BD 1B1-B
0-LGT-247-R065	734.0, A2/t	480V SD BD 1A1-A
0-LGT-247-R066	734.0, A2/u	1-PCV-1-5 Handwheel
0-LGT-247-R067	734.0, A3/s-t	480V SD BD 1A2-A
0-LGT-247-R068	734.0, A4/u	General Area, CCS PMP C-S Transfer switch via open door

TABLE V-1, 8 HOUR EMERGENCY LIGHTING UNITS

COMP. ID	DESCRIPTION	ILLUMINATED COMPONENTS
0-LGT-247-R069	734.0, A5/u-v	General Area
0-LGT-247-R070	734.0, A4/u	General Area
0-LGT-247-R071	734.0, A3/u-v	General Area
0-LGT-247-R072	734.0, A8/u	General Area
0-LGT-247-R073	734.0, A11/u-v	General Area
0-LGT-247-R074	734.0, A12/v	General Area
0-LGT-247-R075	734.0, A4/q	VBB Rm I (bkrs & rear of Pnl 4)
0-LGT-247-R076	734.0, A5/q	VBB Rm II (bkrs & rear of Pnl 4)
0-LGT-247-R077	734.0, A2/u	1-PCV-1-30 Handwheel
0-LGT-247-R078	734.0, A3/q	General Area
0-LGT-247-R079	734.0, A11/q	VBB Rm III (bkrs & rear of Pnl 4)
0-LGT-247-R080	734.0, A12/q	VBB Rm IV (bkrs & rear of Pnl 4)
0-LGT-247-R081	734.0, A13/u	2-PCV-1-30 Handwheel
0-LGT-247-R082	734.0, A6/q	PNL 1-L-11A
0-LGT-247-R083	734.0, A6/r	PNL 1-L-11B
0-LGT-247-R084	734.0, A10/q	PNL 2-L-11A
0-LGT-247-R085	734.0, A10/r	PNL 2-L-11B
0-LGT-247-R086	706.0, T2/k	General Area
0-LGT-247-R087	706.0, T8/k-m	General Area
0-LGT-247-R088	706.0, T8/m	Up/Dn Stairwell
0-LGT-247-R089	706.0, Stair C1	Up/Dn Stairs & Doors
0-LGT-247-R090	706.0, Stair C2	Up/Dn Stairs & Doors
0-LGT-247-R091	714.0, A12/s	General Area
0-LGT-247-R092	714.0, A8/s	FCV-70-193, -194, -197, -198
0-LGT-247-R093	714.0, A5/s	General Area
0-LGT-247-R094	714.0, A3/t	1-VLV-3-827 & -828

TABLE V-1, 8 HOUR EMERGENCY LIGHTING UNITS

COMP. ID	DESCRIPTION	ILLUMINATED COMPONENTS
0-LGT-247-R095	714.0, A5/t	General Area
0-LGT-247-R096	714.0, A12/t	General Area
0-LGT-247-R097	714.0, Stair A13/u	Up/Dn Stairs & Doors
0-LGT-247-R098	714.0, A13/v	2-VLV-3-835,-834, 2-FCV-3-172,-173
0-LGT-247-R099	714.0, A11/v-w	General Area
0-LGT-247-R100	714.0, A8/v	General Area
0-LGT-247-R101	714.0, A7/w	General Area
0-LGT-247-R102	714.0, A5/v-w	General Area
0-LGT-247-R103	714.0, A3/v	1-VLV-3-835,-834, 1-FCV-3-172,-173
0-LGT-247-R104	714.0, Stair A3/u	Up/Dn Stair & Doors
0-LGT-247-R105	706.0, A2/v	1-LCV-3-175, -174, 1-FCV-1-18
0-LGT-247-R106	706.0, A2/u	General Area
0-LGT-247-R107	714.0, A3/s	1-VLV-3-826,-829
0-LGT-247-R108	714.0, A13/s	2-VLV-3-827,-828
0-LGT-247-R109	706.0, A14/u-v	General Area
0-LGT-247-R110	706.0, A14/u-v	General Area
0-LGT-247-R111	706.0, A14/v	2-LCV-3-175,-174, 2-FCV-1-18
0-LGT-247-R112	706.0, A2/u	General Area
0-LGT-247-R113	714.0, A5/w	HSs on JB 3801
0-LGT-247-R114	714.0, A10t	1-FCV-67-146, 0-FCV-67-152
0-LGT-247-R115	714.0, A10/s	0-FCV-67-151, 2-FCV-67-146
0-LGT-247-R116	714.0, A12/w	HSs on JB 3804
0-LGT-247-R117	706.0, T4/m	Gen Area, Doors C28 & C29
0-LGT-247-R118	706.0, T12/m	Gen Area, Doors C34 & C35
0-LGT-247-R119	706.0, C4/n	Corridor, Doors C30 & C58
0-LGT-247-R120	706.0, C4/p	Gen Area, Doors C29 & C58

TABLE V-1, 8 HOUR EMERGENCY LIGHTING UNITS

COMP. ID	DESCRIPTION	ILLUMINATED COMPONENTS
0-LGT-247-R121	706.0, C10/n	Door C34 & Gen Area
0-LGT-247-R122	685.0, T5/j	1-VLV-1-868
0-LGT-247-R123	685.0, T6/k	Station Air Compressor A & B
0-LGT-247-R124	685.0, T8/k	General Area, 0-33-500,-501
0-LGT-247-R125	685.0, T9/n	Stairwell
0-LGT-247-R126	685.0, T12/j	2-VLV-1-868
0-LGT-247-R127	685.0, Stair C2	Up/Dn Stairs & Doors
0-LGT-247-R128	685.0, C7/n	Corridor, Doors C22 & C24
0-LGT-247-R129	685.0, Stair C1	Up/Dn Stairs & Doors
0-LGT-247-R130	685.0, C9/n	General Area
0-LGT-247-R131	685.0, C5/n	General Area
0-LGT-247-R132	685.0, T2/k	Stairs, 685.0 to 706.0
0-LGT-247-R133	685.0, T8/j-k	N-S Aisle between J-K
0-LGT-247-R134	690.0, A1/q	General Area
0-LGT-247-R135	690.0, A2/s	General Area, 0-FCV-67-205, -208, 1-FCV-67-162
0-LGT-247-R136	690.0, A3/t-u	1-FCV-3-116A,-116B, Door A62, 1-FCV-67-164, 1-PI-3-117
0-LGT-247-R137	690.0, A4/s	1-FCV-3-126A,-126B, 1-PI-3-127
0-LGT-247-R138	690.0, A5/s	General Area
0-LGT-247-R139	690.0, A8/t	General Area, 1-FCV-70-153, -156
0-LGT-247-R140	690.0, A10/t	General Area, 2-FCV-70-153, -156
0-LGT-247-R141	690.0, A11/s	General Area, 2-PI-3-117
0-LGT-247-R142	690.0, A13/t	2-FCV-3-126A,-126B, DoorA75
0-LGT-247-R143	690.0, A15/v	General Area
0-LGT-247-R144	690.0, A13/u	General Area

TABLE V-1, 8 HOUR EMERGENCY LIGHTING UNITS

COMP. ID	DESCRIPTION	ILLUMINATED COMPONENTS
0-LGT-247-R145	690.0, A13/v	2-LCV-62-132,-133, VCT Rm entrance
0-LGT-247-R146	690.0, A12/v-w	General Area
0-LGT-247-R147	690.0, A9/v	General Area
0-LGT-247-R148	690.0, A4/v	General Area
0-LGT-247-R149	690.0, A3/v	1-LCV-62-132,-133, VCT Rm entrance
0-LGT-247-R150	690.0, A3/u	General Area
0-LGT-247-R151	690.0, A1/v	General Area
0-LGT-247-R152	690.0, A11/w	2-FCV-62-63
0-LGT-247-R153	690.0, A11/w	2-FCV-62-77, 2-FCV-70-85,-143
0-LGT-247-R154	690.0, A12/t	2-FCV-3-116A, -116B, 2-PI-3-127, 2-FCV-67-217, 219
0-LGT-247-R155	690.0, A5/w	1-FCV-62-63
0-LGT-247-R156	690.0, A5/w	1-FCV-62-77, 1-FCV-70-85,-143
0-LGT-247-R157	690.0, A4/u	1-VLV-62-692, -693
0-LGT-247-R158	690.0, A12/u	2-VLV-62-692, -693
0-LGT-247-R159	669.0, A4/s	General Area, 1-L-112A
0-LGT-247-R160	669.0, A6/t	General Area
0-LGT-247-R161	669.0, A12/s	General Area
0-LGT-247-R162	669.0, A14/t	2-FCV-3-136A,-136B,179A,-179B, 2-PCV-3-183, 2-PI-3-137, -184
0-LGT-247-R163	669.0, A13/t	General Area, 2-XS-46-57
0-LGT-247-R164	669.0, A13-14/u-v	2-LCV-62-136, Sump Valve Box
0-LGT-247-R165	669.0, A12/u-v	2-VLV-62-537, 538, 539, Sump Valve Box
0-LGT-247-R166	669.0, A13/t	2-VLV-62-526, -527
0-LGT-247-R167	669.0, A11/t-u	2-VLV-62-533, -534
0-LGT-247-R168	669.0, A9/v	General Area

COMP. ID	DESCRIPTION	ILLUMINATED COMPONENTS
0-LGT-247-R169	669.0, A4/u-v	1-VLV-62-537, -538, -539, Sump Valve Box
0-LGT-247-R170	669.0, A2-3/s-t	1-LCV-62-135, -136, Sump Valve Box
0-LGT-247-R171	669.0, A1/t	1-FCV-3-136A,-136B,-179A,-179B, 1-VLV-3-918, -919, 1-FCV-1-51 cntrls, 1-PCV-3-183, 1-PI-3-137, -184
0-LGT-247-R172	669.0, A2/t-u	PNL 1-L-381, 1-XS-46-57
0-LGT-247-R173	669.0, A4/u	1-VLV-62-526,-527
0-LGT-247-R174	669.0, A4/u	1-VLV-62-533,-534
0-LGT-247-R175	669.0, A2/u	1-LCV-62-135,-136
0-LGT-247-R176	669.0, A15/t	PNL 2-L-381
0-LGT-247-R177	669.0, A14/u	2-FCV-1-51 Ctrls, 2-VLV-3-918, -919
0-LGT-247-R178	669.0, A11/s	PNL 2-L-112A, General Area
0-LGT-247-R179	669.0, A13/u	2-LCV-62-135,-136
0-LGT-247-R180	653.0, A7/u	General Area
0-LGT-247-R181	653.0, A9/u-v	General Area
0-LGT-247-R182	722.0, Stair D1	Up/Dn Stair & Doors
0-LGT-247-R183	722.0, 722.0-1	General Area
0-LGT-247-R184	722.0, 722.0-2	General Area
0-LGT-247-R185	722.0, 722.0-9	General Area
0-LGT-247-R186	722.0, 722.0-9	General Area
0-LGT-247-R187	722.0, 722.0-9	General Area
0-LGT-247-R188	722.0, 722.0-7	Gen Area, PNL 2-L-163
0-LGT-247-R189	722.0, 722.0-7	General Area
0-LGT-247-R190	722.0, 722.0-6	Gen Area, PNL 1-L-163
0-LGT-247-R191	722.0, 722.0-6	General Area
0-LGT-247-R192	722.0, 722.0-5	Gen Area, PNL 2-L-272
0-LGT-247-R193	722.0, 722.0-5	General Area

COMP. ID	DESCRIPTION	ILLUMINATED COMPONENTS
0-LGT-247-R194	722.0, 722.0-4	Gen Area, PNL 1-L-272
0-LGT-247-R195	722.0, 722.0-4	General Area
0-LGT-247-R196	740.5, 740.5-1	General Area
0-LGT-247-R197	740.5, 740.5-4	480V BD RM 1A
0-LGT-247-R198	740.5, 740.5-7	480V BD RM 2A
0-LGT-247-R199	740.5, 740.5-10	480V BD RM 1B
0-LGT-247-R200	740.5, 740.5-13	480V BD RM 2B
0-LGT-247-R201	732.0, C10/n	Corridor, Doors C53 & C55
0-LGT-247-R202	749.0, A2/u	1A-A Exh Fan Dampers
0-LGT-247-R203	749.0, A2-3/s-t	1A-A Exh Fan Dampers
0-LGT-247-R204	759.0, A12/v	CRDM M-G Set Bkr A&B
0-LGT-247-R205	714.0, A13/t	2-VLV-3-826 & -829

1.0 INTRODUCTION

Part VI determines the level of compliance with applicable NFPA codes. The objective is achieved by:

(1) reviewing documentation and plant procedures to determine the location of passive and active fire protection features;

(2) identifying the codes and standards of the National Fire Protection Association (NFPA) to which SQN is committed for the installation of passive and active fire protection features; and

(3) comparing SQN's existing levels and configurations of passive and active fire protection features against the criteria contained within each applicable NFPA code and standard.

Where deviations from the code criteria are identified, justifications for existing configurations to demonstrate equivalent levels of protection may be required. Those code deviations that have a potential impact on the operational capabilities of the specific fire protection feature are identified and justified in Part VII, Section 5 of the FPR. Partial detection and suppression code deviations in locations which require full detection and suppression in order to comply with 10CFR50 Appendix R are identified and justified in Part VII, Section 2 (alternative shutdown requirements in the control building) and Part VII, Section 3 (full detection and suppression evaluations) of the FPR. Those code deviations which do not impact on the operational capabilities of the specific fire protection feature are identified and justified in Section 3.0 of this part. The compliance status of SQN fire protection features against the applicable codes is identified in this Part.

The inspection, testing, maintenance, and training on fire protection features within each code was not reviewed for compliance. Part II, Section 14.0 of the FPR identifies the scope of testing and inspection, and related frequency for regulatory required fire protection systems and features.

2.0 SCOPE

The scope of this evaluation is limited to those fire protection systems or features that are provided for those buildings and areas that contain systems, cables, or components relied on for safety related and fire safe shutdown (FSSD) purposes. This evaluation addresses fire protection systems or features in the reactor buildings, auxiliary building, control building, diesel generator building, turbine building, additional equipment buildings, and intake pumping station.

Other buildings that do not contain systems, components, or cables relied on for safety related and FSSD purposes are not included in the scope of this review.

The scope of the review was to identify the passive and active fire protection features as installed and evaluate the level of compliance with the applicable NFPA codes. Included in this review were automatic detection systems, manual and automatic fixed suppression systems (water-based and carbon dioxide suppression systems), fire doors, fire dampers, manual hose stations, portable extinguishers, exterior hydrants and fire pumps.

The scope of this evaluation was accomplished through a combination of field walkdowns and a review of documentation for references to passive and active fire protection features. Those codes which are referenced in Appendix A to BTP 9.5-1 are covered in this Part, with documentation reviewed and/or field walkdowns performed to evaluate those fire protection features that are relied on for compliance with Appendix A to BTP 9.5-1 and Appendix R to 10CFR50. Documentation reviews and/or field walkdowns were not performed for all applicable codes referenced in Appendix A to BTP 9.5-1. Section 3.3 provides the bases for the level of review and methods of documentation for each applicable NFPA code addressed in this Part.

To establish the level of compliance with the NFPA codes addressed in this Part, plant documentation dealing with fire protection related issues was reviewed. Information on the fire protection features was then reviewed to determine the level of compliance or applicability with the NFPA codes. As a general rule, the appendix of each NFPA code states that it is not a portion of the code and is included for information purposes only. As such, appendices to the codes were not included in the scope of the evaluation. However, where appropriate, the guidance contained in the appendices was utilized to either justify existing configurations or identify additional fire protection features that should be provided.

The code conformance evaluation was conducted by experienced fire protection engineers familiar with the application of NFPA codes and standards to nuclear power plants. Personnel holding Member Grade status in the Society of Fire Protection Engineers were responsible for review of the level of code compliance and preparation of the bases for justification of deviations identified in this Part. The code conformance evaluation was developed and/or reviewed by both engineering and fire operations personnel.

3.0 APPLICABLE NFPA CODES

In order to determine which NFPA codes require review at SQN, NFPA codes listed in Appendix A to BTP 9.5-1 were identified. A total of 30 NFPA codes are specifically identified; however not all the codes are directly applicable to SQN. Codes not applicable to SQN were identified, along with the bases for non-applicability.

3.1 NFPA Codes Not Applicable - General

The following NFPA codes are not applicable to SQN because the code requirements are not directly applicable to the multi-story noncombustible construction structures such as those at SQN:

NFPA 92M-1972 — Waterproofing and Draining of Floors
(Waterproofing of floors is not required at SQN. Adequate drainage exists as documented in suppression effects calculations.)

NFPA 204-1968, — Smoke and Heat Venting
(Smoke and heat venting is covered by pre-fire plans and implemented by the fire brigade. Additionally, plant operating procedures further support the operation of systems utilized in smoke and heat venting activities. NFPA 204 was applicable to single story structures and has been superseded by NFPA 204M.)

The following NFPA codes are considered not applicable to SQN because the codes provide general guidance on training and organization of fire brigades and guidance on fire loss prevention, some of which have also been superseded by new codes:

NFPA 4-1977	Organization for Fire Services
NFPA 4A-1969	Fire Department Organization
NFPA 6-1974	Recommendations for Organization of Industrial Fire Loss Prevention
NFPA 7-1974	Recommendations for Management Control of Fire Emergencies
NFPA 8-1974	Recommendations for Management Responsibility for Effects of Fire on Operations
NFPA 27-1975	Private Fire Brigades
NFPA 197-1966	Initial Fire Attack, Training, Standard On
NFPA 601-1975	Guard Service in Fire Loss Prevention

The training and organization of the SQN fire brigade is identified in detail in Part II of the FPR, thereby demonstrating proper training and organization of onsite fire fighting capabilities.

3.2 NFPA Codes Not Applicable Site-Specific Fire Protection Features

A number of NFPA codes that are typically applicable to nuclear power plants are not applicable based on site-specific methods for implementation of fire protection features. In most cases, existing fire protection features were identified and evaluated for the level of protection afforded by the fire protection feature. This approach was applicable to specific features with code requirements that did not readily lend themselves to an in-depth code evaluation. Compliance with code criteria is only provided to the extent identified below for the existing fire protection features.

3.2.1 NFPA 10-1975: Portable Fire Extinguisher

Portable extinguishers are not installed in accordance with the spacing and location criteria nor inspected at the specified frequency of NFPA 10. Portable extinguishers are provided solely for the use by personnel trained in their use. Fire brigade members and hot work fire watches receive hands-on training in use of portable extinguishers. Fire brigade members are also cognizant of the location of extinguishers for fire fighting purposes through the extinguisher inspection program and pre-fire plans. The experience history was used as a base for an inspection frequency of quarterly. Refer to Part II, Section 14.0 of this FPR for more information.

3.2.2 NFPA 11B-1977: Foam-Water Sprinkler Systems

NFPA 11B is not applicable because foam-water sprinkler systems are not located in plant buildings that contain systems, components, or cables relied on for fire safe shutdown.

3.2.3 NFPA 12A and 12B: Halon 1301 and 1211 Extinguishing Systems

NFPA 12A and NFPA 12B are not applicable because these systems are not located in plant buildings that contain systems, components, or cables relied on for fire safe shutdown.

3.2.4 NFPA 25-1993: Water System Tests

NFPA 25 is not a code of record at SQN for any specific fire protection feature test and inspection requirement.

3.2.5 NFPA 26-1958: Valve Supervision

SQN's method of ensuring valve position is identified in Part II of the FPR. Valve positions are inspected in accordance with plant procedures.

3.2.6 NFPA 49-1975: Hazardous Chemical Reactions

Hazardous chemical reaction code criteria are only applicable to the storage and handling of chemicals by the chemistry department. Administrative procedures govern hazardous chemical use. The criteria of NFPA 49 has no impact on the fire safe shutdown conformance program and was therefore not reviewed.

3.2.7 NFPA 50A-1973: Gaseous Hydrogen Systems

Hydrogen is supplied to the volume control tanks (VCT) through seismically qualified piping from the exterior wall of the auxiliary building to the VCTs. The piping is seismically designed for pressure boundary retention between the VCTs and the isolation valves adjacent to the tanks. The remainder of the piping in the Auxiliary Building is seismically supported but not designed for pressure boundary retention. Two isolation valves are installed on the hydrogen supply line on the exterior wall of the Auxiliary Building that are designed to close automatically on high hydrogen flow rate in the downstream piping.

3.2.8 NFPA 51-1975: Oxygen Fuel Gas Systems for Welding and Cutting

NFPA 51 is applicable to large manifolded oxygen fuel gas systems and the use of oxy-acetylene cylinders for cutting and welding activities. Large manifolded systems are not used at SQN. The use of oxy-acetylene cylinders is controlled through the approval and control of ignition source activities and is discussed in NFPA 51B.

3.2.9 NFPA 90A-1975: Air Conditioning and Ventilation Systems

The heating, venting and air conditioning (HVAC) systems at SQN are not designed to NFPA 90A. The HVAC systems are designed as described in FSAR chapters 3, 6 and 9. The required locations for fire dampers were reviewed by a comparison of HVAC duct locations and the locations of regulatory fire barriers. Specific HVAC penetrations through regulatory fire barriers without fire dampers are addressed in Part VII of the FPR. Damper closure under air flow conditions are addressed by shutting off HVAC fans where necessary. Justification for sealing thermal expansion gaps between the ductwork and the barrier is provided by fire test documentation. Access to fire dampers is usually provided by access doors. However, in some cases, bolted connection duct sections require removal for access to fire dampers.

3.2.10 NFPA 251: Fire Tests of Building Materials

The fire rating of walls and floor/ceiling assemblies is based on a comparison with typical UL designs as documented in Part II of the FPR. The fire rating of raceway fire barrier materials is addressed under a separate program that has been reviewed in detail by the NRC. There are no other claims regarding SQN's level of compliance with NFPA 251.

3.3 Applicable NFPA Codes Reviewed in Detail for Compliance

The remaining NFPA codes referenced in Appendix A to BTP 9.5-1 are applicable and relied on to establish compliance with fire safe shutdown regulations and guidance documents. Detailed code evaluations were conducted on the applicable sections of these codes to identify code requirements. Sections on the code that are not applicable to SQN are not discussed in the following evaluations. Documentation was reviewed and field investigations were conducted in order to establish the level of compliance with code requirements.

The following list identifies the codes, along with the year of the edition, which were used to evaluate the adequacy of existing fire protection features against code requirements:

3.3.1	NFPA 12-1973	Carbon Dioxide Systems (Chapter 1 & 2)
3.3.2	NFPA 13-1975[1]	Automatic Sprinkler Systems (refer to Part VII)
3.3.3	NFPA 14-1974	Standpipe and Hose Systems (Chapters 1-7)
3.3.4	NFPA 15-1973	Water Spray Fixed Systems for Fire Protection
3.3.5	NFPA 20-1973 & NFPA 20-1993	Centrifugal Fire Pumps[2]
3.3.6	NFPA 24-1973	Outside Protection

[1]NFPA 13-1987 is the COR for the wet pipe sprinkler systems installed in the Turbine Building.

[2]NFPA 20-1993 will be the COR for the new fire pump installation.

3.3.7	NFPA 30-1973	Flammable and Combustible Liquids Code (Chapter 4 & 5)
3.3.8	NFPA 51B-1976	Cutting and Welding Processes
3.3.9	NFPA 69-1973	Explosion Prevention Systems
3.3.10	NFPA 72D-1975	Proprietary Protective Signaling Systems
3.3.11	NFPA 72E-1974	Automatic Fire Detectors (All)
3.3.12	NFPA 80-1981	Fire Doors and Windows (All)
3.3.13	NFPA 194-1974 & NFPA 196-1974	Fire Hose Connectors (All) and Fire Hose (All)

Note that TVA is typically the designer, installer, operator, maintainer, owner and also that the Corporate Engineering, Chief Engineer serves as the Authority Having Jurisdiction (AHJ). For many fundamental NFPA code requirements, the TVA design process, construction specifications, operating and maintenance instructions, drawing control and approval process for nuclear plants take precedence (e.g., drawing preparation and format, calculation preparation and format, etc.).

A summary description of code compliance is provided for each of the above codes.

3.3.1 NFPA 12-1973: "Carbon Dioxide Systems"

NFPA 12-1973 is the Code of Record (COR) for SQN CO_2 systems. The CO_2 systems at SQN are identified as System 39 and are installed in selected areas for protection of safety-related and non-safety-related equipment. SQN is in general compliance with NFPA-12-1973. Operation of the CO_2 fire protection system is not required for safe shutdown. Safe shutdown is provided by Appendix R III.G and III.L separation in conjunction with fire detection, automatic sprinklers and electrical raceway fire barrier systems. Therefore NFPA 12-1973 will not be reviewed in detail for compliance.

3.3.2 NFPA 13-1975: Automatic Sprinkler Systems

This is the COR applicable to pre-action and deluge system installed in safety related areas at SQN. SQN has non-safety-related under deck wet pipe sprinkler systems installed in the turbine building. The turbine building wet pipe sprinkler systems were designed/and installed to NFPA 13 (1987) and American Nuclear Insurer Requirements. Preaction and deluge systems are operated and maintained in accordance with approved operating and maintenance procedures. Preoperational, post-modification and periodic surveillance tests (except main drain test) ensure system operational status. Fire pumps are addressed under NFPA-20. Piping is supported per TVA seismic design requirements. Drain lines are fitted with hose connections to facilitate drainage. Risers are not equipped with flanged joints at each floor due to other factors affecting the sprinkler system design in a nuclear plant environment. The sprinkler systems are typically hydraulically designed. Valves that are required to be locked and/or sealed in a required position are verified periodically to be locked and/or sealed. Typically, all sprinkler flow control valves are supplied by water from two directions with section isolation valves used in lieu of check valves (except inside containment). Fire department connections are not provided for sprinkler systems serving nuclear safety related areas. Valves are typically numbered and identified on configuration controlled drawings and name tags in the field.

Literal code conformance for the exact location and spacing of sprinkler heads is not always achievable due to congestion (e.g., tray, conduit, and pipe supports). Extensive sprinkler system walkdowns were conducted as part of the Appendix R reevaluation. The spacing and location of sprinklers, branch lines, sprinkler spray patterns, and types of sprinklers are addressed in the sprinkler design packages and sprinkler walk downs done for compliance with Appendix R intervening combustibles and to address major obstructions. In plant areas required for spatial separation with intervening combustibles, the sprinklers were modified to comply with the intervening combustible sprinkler system criteria. Sprinklers under ducts, decks, galleries, and open gratings over 4 feet wide are typically provided when required by the intervening combustible deviation criteria. See Part VII of the FPR. In other areas, the sprinkler systems have been designed to meet the general intent of the code, however, deviations from the code requirements do exists.

Nonenclosed or unprotected elevators, stairs, and shafts are not provided with water curtains and draft stops except between where required for separation of safe shutdown equipment. See Part X and VII of this FPR.

Seismic piping design and spray shields are provided on select sprinkler systems when necessary to protect at least one train of safe shutdown equipment from damage due to inadvertent spray.

Pressure gages are installed above and below preaction valves; however, they do not serve an operation function. Hydraulically designed sprinkler system calculations are performed in accordance with TVA Nuclear Engineering Procedure (NEP) 3.1 Calculations. Information is documented on a combination of drawings (flow, isometric, pipe layout) and calculations.

Strainers are typically provided in the supply to each preaction valve. Flushing connections are not provided. Auxiliary drains for trapped water in piping are provided in lieu of 2 valves and 2" nipples.

See Part VII of this FPR for additional evaluations (i.e. bushings, etc.).

3.3.3 NFPA 14-1974: Standpipe and Hose Systems

This code applies to piping, valves, hoses and fire nozzles installed in the interior of safety related structures for the purpose of manual fire fighting. Interior hose systems are 1 1/2" and designed for 100 gpm. These hose stations do not meet literal compliance with the code. Supply piping may be < 4" in some cases. Some standpipes have > 100' of hose attached. Hose stations are located in or near the enclosed stairways of the control building. Main riser valves are not all post indicator types. Hose connections are 2 1/2 " diameter on the roof of safety-related structures. Branch lines serving more than one hose station do not always have isolation valves.

Fire department connections are not provided for standpipe/hose systems serving nuclear safety related areas.

SQN provides hose stations for fire brigade use as discussed in Part II, Section 9.0. Plant personnel are instructed in General Employee Training to not use such equipment unless they are trained in its use. Fire brigade personnel are adequately trained in the use of the hose stations.

Approved hose valves are used at each outlet. The fire brigade is trained in the use of fire hose where pressures in excess of 100 psi can be experienced. The fire hose is maintained to accommodate these higher pressures. Therefore, the pressure reducing devices are not required.

Standpipes in auxiliary and control buildings are interconnected to the buildings internal HPFP loop, but not necessarily at the lowest elevation.

Indicating and check valves at connections to water supplies are not always provided. Standpipes can be isolated by system 26 (HPFP system) valves in the piping network. Check valves to prevent back flow are not warranted.

High pressure valves are not used, even though system spikes in excess of design pressure can occur due to pump start surges before relief devices compensate. This is acceptable and in accordance with the systems ANSI B31.1 requirements.

Listed materials are used and the piping can withstand working pressure of system. Piping is in accordance with ANSI B31.1 material requirements.

Valves of approved indicating type are not provided at main riser in all cases. Sprinkler systems can be isolated and not preclude ability to provide hose stream coverage.

Water supply control valves to standpipes are not post indicating type.

The supply valves are under administrative controls (e.g., locking or sealing the valve in position, and strict control of work) and the access restriction to trained and qualified personnel provides adequate assurance that the valves are in the proper position.

The tops of each standpipe do not have a 3 1/2 inch dial spring pressure gage.

Activation of push button stations in the Unit 1 and Unit 2 annulus and lower containment will cause an alarm to be annunciated in the MCR fire detection alarm console. Flow alarms are not provided on all standpipes. As previously stated, the hose stations are provided for trained fire brigade personnel. Other site personnel are trained to report fires. After reporting a fire an individual may attempt to extinguish the fire only if he/she has been trained in the use of fire fighting equipment (see part II, Section 7.8). Adequate notification of standpipe operation will therefore be communicated to the Main Control Room.

3.3.4 NFPA 15-1973: Water Spray Fixed Systems for Fire Protection

Four distinct types of water spray fixed systems for fire protection are used to protect special hazards in safety related areas. The hazards protected are unique to a nuclear power plant and therefore direct code application and compliance is beyond the scope of NFPA 15 in respect to the overall goals of the National Fire Codes. However, NFPA 15-1975 forms the design basis of the water spray systems. Listed below is a synopsis of each system and the key application of NFPA 15.

3.3.4.1 Reactor Coolant Pumps (RCP)

Each of the four RCPs are protected by a closed head, automatic pre-action water spray fixed system. Listed nozzles are located around the top of the RCP motor along a ring header. The systems are hydraulically designed in accordance with NFPA 13 & 15 and produce a minimum design density of 0.25 gpm/ft^2. This density corresponds to NFPA 15 requirement for transformer protection (oil hazard). The pre-action system is automatically actuated upon initiation of cross zoned thermal detectors located above the motor.

3.3.4.2 Charcoal Filters

Closed head, automatic pre-action water spray fixed systems are provided for the Control Room Emergency Air Cleanup (CREAC), Containment Purge Air Exhaust System (CPAES), Emergency Gas Treatment System (EGTS), and the Auxiliary Building Gas Treatment System (ABGTS). The use of water spray fixed systems for protection of charcoal filters is the only type of suppression system recognized by NFPA 803-1983 (Table 10-1.2). The systems are hydraulically designed in accordance with NFPA 13 & 15 and produce a minimum design density of 0.25 gpm/ft^2 across the surface of the exposed filters.

In accordance with NFPA 15, Section 4-4.1.2, a design density was determined for this unique application based on analysis of the combustibles. The flow density of 0.25 gpm/ft^2 corresponds to the flow density specified in Section 5-4.6.1 of NFPA 850, "Recommended Practice for Fire Protection for Fossil Fueled Steam Electric Generating Plants" for sprinklers provided for coal handling structures subject to accumulations of coal or coal dust. Charcoal filters have a lower heat energy value (i.e., Btu/volume) than coal (based on lesser density and chemistry of the material). The flow density of 0.20 gpm/ft^2 over the plan area for bag-type dust collectors (in coal handling facilities) is adequate for the hazard. Therefore the use of 0.25 gpm/ft^2 for the charcoal is conservative.

The temperatures for the fusible elements in the spray nozzles was determined by correlating the maximum temperature expected in the filter units to the recommendations of NFPA 13, Table 2-2.3.1, "Temperature Ratings, Classifications and Color Codings."

In the event of a charcoal fire in the ABGTS, EGTS, CREAC or CPAES filter units, the thermal/smoke detectors will annunciate the alarm and trip the spray system's deluge valve, allowing water up to the closed nozzles. After shutdown of the fan and closure of the downstream damper, the heat will build inside the unit. This will ensure operation of the thermal elements in the nozzles if they have not previously been activated by the fire.

The Post Accident Sampling System (PASS) charcoal filter is furnished with a manually actuated open head fire suppression system connection which is designed for a 12 gpm flow rate at 65 psig in the High Pressure Fire Protection (HPFP) water supply at the charcoal filter header. The PASS charcoal filter fire protection system will be manually actuated in the event of a fire in the charcoal unit. This will preclude the possibility of inadvertent actuation and subsequent wetting of the charcoal. Automatic detection is not considered warranted for this specific installation in the PASF filters. A manually actuated valve is used. These filters see very limited use (short periods only after an accident), unlike the other systems which would probably be used continuously during a radiological emergency. The heavy duty air tight construction of the filter system enclosure would likely contain a charcoal fire (charcoal used in this manner typically does not produce flaming combustion, but rather smolders) and there are no significant quantities of combustibles

located near the filter enclosures. As secondary protection to the enclosure, the room the PASF filter enclosures are contained in is provided with automatic detection. Manual standpipe hose stations are available for exterior application, if needed.

3.3.4.3 Reactor Building Containment Annulus Cable Interactions

An automatic, pre-action sprinkler system, utilizing standard upright sprinkler heads, provides a unique application of a water spray fixed system in the reactor building containment annulus. Section III.G.2.e of 10CFR50 Appendix R, allows the use of "fire detectors and an automatic fire suppression system in the fire area" as one of the means of providing fire protection of safe shutdown capability inside a non-inerted containment.

3.3.4.4 Cable Tray Water Spray Systems

Two open head water spray systems are installed to protect the (1) Train A cable trays in the 480v shutdown board room 1B2-B and (2) Train B cable trays in the 480v Shutdown Board Room 2A2-A. Each system is actuated by line type thermal detectors located at the top and bottom of the protected stack of trays crossed zoned with smoke detectors.

3.3.5 NFPA 20-1973 & 1993: Centrifugal Fire Pumps

The potable water supplied HPFP pumps are a standard fire pump design from a fire pump manufacturer and meets all the requirements of NFPA-20, 1993. Refer to Part II for a description of the fire pumps.

3.3.6 NFPA 24-1973: Outside Protection

The code applies to yard piping supplying, hydrants, sprinklers, hose stations, etc. The system 26 (high pressure fire protection system) flow diagrams are under configuration control and maintained in the Main Control Room. This clearly complies with the intent of the code (as applicable to a nuclear plant). SQN does not rely on the public water system for pressure/capacity. Adequate water supply is determined by flow test. Yard mains are of ample size. No pressure regulating valves used in the main process water supply flowpath. Pressure control valves are used similar to relief valves to control over pressure conditions. Automatic pump start is described in Part II.

The HPFP system is a dedicated potable water system. Water for the fire pump storage tanks is supplied by the municipal utility. The HPFP system is normally pressurized when the fire pumps are not running by a cross connect to the fire tank potable water supply and two jockey pumps which automatically start if the potable water supply cannot maintain system header pressure. The cross connect is downstream of the potable water backflow preventer and contains a pressure regulator and check valve to isolate the fire protection system from a failure of the potable water supply and prevent recirculation back to the fire tanks during fire pump operation.

The two 8" carbon steel headers from the IPS to the AB and ERCW station are not lined. These headers serve as nuclear safety-related supplies to the Steam Generators during flood mode operations.

Fire department connections are not used for safety related areas (approved by AHJ). Both indicating and non-indicating valves are used in the HPFP system. Check valves are in accordance with approved material (e.g., ANSI B31.1).

Post indicating valves (PIV) are not installed in all required locations. Some PIVs are not located exactly 36" above the ground level (grade), but are accessible for proper operation. Break-away locks or seals are used on fire protection system valves to administratively control their position. Inspection of valve positions are performed at the frequency specified in Part II, Section 14.0.

The requirement for hose houses and equipment criteria is met by mobile apparatus and/or hose houses. Couplings are of same size and thread, and are interchangeable with those of the local fire department. Nozzles are of the approved type. Selection, coating and lining, and fitting of joints for piping is per TVA design, construction, and modification procedures. These procedures provide guidance that meets or exceeds the code. A loop system is provided for systems in the DGB, CB, AB, and RBs. Minimum size of underground pipe is 6 inches except for the 4" supply to the DGB.

3.3.7 NFPA 30-1973: Flammable and Combustible Liquids

NFPA 30-1973 was only evaluated for storage and transport of combustible materials (Chapters 4 & 5). SQN is in general compliance with the intent of applicable sections of chapters 4 and 5 (i.e., approved containers, size, storage cabinets, tanks, closed containers, covered containers, fire extinguishers, repairs and housekeeping, etc.).

3.3.8 NFPA 51B-1976: Cutting and Welding Processes

The use of ignition sources such as welding, flame cutting, thermite welding, thawing pipe brazing, grinding, arc gouging, torch applied roofing, and open flame soldering within safety-related areas are controlled through the approval and issuance of a permit. TVA adequately addresses the primary functional requirements of NFPA 51B through the implementation of administrative controls, permits that are reviewed and approved by appropriate plant personnel, and the use of fire watches for ignition source work activities in safety-related areas of the plant. Refer to Part II, Section 11.0 for more details.

Designated smoking areas are located outside of building structures.

3.3.9 NFPA 69-1973: Explosion Prevention Systems

NFPA 69 is applicable only to the battery rooms. The exhaust air system for these areas is designed to limit the potential build-up of hydrogen gas to less than 2%. The systems as installed meet the intent of the code; however, there are no means to control and monitor the combustible gas concentration.

3.3.10 NFPA 72D-1975: Proprietary Protective Signaling System

NFPA 72D-1975 applies to TVA System 13. The system is typically a "Class A" supervised system. The central supervising station is located in the Main Control Room which is a security area with strict access control. The system is arranged to receive and record all signals, and a direct supervised circuit to local fire department is not deemed necessary. The fire alarm console in the Main Control Room is a UL listed device designed by Pyrotronics, Inc. The audible alarm levels have been adjusted to meet the

requirements of the human factors analysis for the MCR. All plant areas do not have audible signals that can be heard above background.

An exception to SQN General Engineering Specification, G-73 R5, "Installation, Modification and Maintenance of Fire Protection Systems and Features," has been implemented to allow the bypassing of the Main Control Room (MCR) audible indicating appliance when a dedicated operator is stationed at the console. NFPA 72D does not address situations in which the alarm device is located in an area in which many audible devices are relied upon to provide continuous monitoring of other plant systems, in addition to the fire protection system. Numerous audible alarms result in a significant distraction to the MCR Operators, who are monitoring other sensitive and safety-related plant equipment. Therefore, an allowance has been implemented to silence, muffle, or mute the audible portion of the indicating appliance based on the contingency that the annunciation may only be altered when an operator has been designated to monitor the console continuously until the normal annunciation system is restored. If the console is to be unattended by a dedicated operator, the audible alarm is to be returned to the normal configuration. Applicable plant procedures provide these specifications.

Access to the "central supervising station" (Main Control Room) is not limited to only those personnel required to operate the system. Site security procedures ensures strict access control for personnel who can be on site and further restricts access to the Main Control Room. Areas in the Main Control Room that involve control functions of the plant, have additional access restrictions applied. The combination of these controls ensure the proper operation of and response to the "central supervising station".

Operation and supervision of the fire alarm station is not the only safety function of the Main Control Room operators. They are responsible for all MCR alarm response functions.

Upon receipt of a selected low threshold fire alarm signal, the fire brigade is not immediately activated. Upon receipt of an alarm from a cross zone detection system, an individual is dispatched to the area to determine cause of alarm. If a fire exists, the individual notifies the Main Control Room and they in turn notify the fire brigade. If both zones of a cross zoned detection system alarm, the fire brigade is notified immediately. Non-cross zoned detector alarms are investigated. This allows alarms to be addressed at a proper level while still maintaining a rapid response by fire brigade to actual fires.

System is rated to operate at 120v +/- 10v and 60 +/-2 cycles. System is nominal 120V.

Water flow actuated devices and transmitters are not being tested every two months. Water flow through the test connection is not performed. A main drain test is not performed after operation of a system isolation control valve. See Section 3.2.2 of Part VI.

The alarm power and trouble power for the local panels come from the same power panel, but from different circuit breakers. The same primary and secondary power supplies power both alarm and trouble circuits. The power service connection and overcurrent protective devices are not in locked panels; however, access to panels is under operations control.

A distinctive signal is used for the central console alarm; however, console alarm signals may not take priority over all other control room signals. Priority is determined by the licensed operators.

Primary and secondary power supply is not within the control room; they are provided for the fire alarm console from offsite and onsite power sources. The fire alarm system has the emergency diesel generators as the automatic secondary power supply. Emergency diesel generators (DG) are not reviewed against NFPA 37, and the DGs are not operated weekly (they are designed, tested, and operated based on FSAR regulatory guide, and Technical Specification requirements with the intent of ensuring the supply is met).

Signal attachments and circuits (pressure switches) can be removed or tampered with and not cause an alarm. The site personnel access control and the work control system provide adequate assurance that work on such devices are properly controlled and documented. Therefore, there is not a need for such alarms as would be in areas accessible to the general public where tampering is a concern.

Releasing circuits for CO_2, sprinkler and spray systems are typically not supervised.

Sprinkler system control valves are not electrically supervised, but are locked or sealed open and periodically inspected. Administrative controls (e.g., locking or sealing the valve in position, and strict site access and work control) for valve manipulation assures that the valve has not been tampered with and is in the proper position.

Both visual and recorded displays are in compliance, but records are not preserved for later inspection. Plant procedures have reporting requirements for conditions adverse to quality. These procedures require that an adverse condition report be initiated when the problem was identified. Printouts can be provided by the fire alarm console to support the adverse condition report and aid in the reconstruction of a sequence of events to meet the intent of the code.

3.3.11 NFPA 72E-1974: Automatic Fire Detectors

Specific areas may not have fire detectors installed. See Part X and VII for specifics. The literal requirement of fire detectors spacing may not have been met in all cases; however the intent is met by providing detectors commensurate with the hazard.

Smoke detectors in the high ceiling areas are not installed alternately on two levels. In general, high ceilings are addressed by reduced spacing of detectors at ceiling level as opposed to two levels of detectors. This is acceptable because stratification is not a concern because of the HVAC mixing of the air and/or the low combustible loading of the area. The spacing of detectors on the refuel floor does not meet code requirements. The existing detectors in conjunction with the room size, ceiling height, combustible loading, and special separation provide a reasonable level of fire protection. (see Part VII. Section 2.1).

Use of the duct detectors in lieu of area detectors is provided for the Reactor Building upper and lower compartment coolers. Regulatory requirements for detectors are met in the Reactor Building. Duct detectors are used to address the cooler hazard. Thermal detectors are used to address the RCP motor hazard.

Duct detectors are not provided per NFPA 90A requirements; fans that service area of the fire are manually shut down when necessary to ensure that air flow will not prevent fire dampers from closing.

3.3.12 NFPA 80-1981: Fire Doors and Windows

A summary door evaluation list was utilized to review fire doors per NFPA 80. As noted on the compartmentation drawings in Part X of the FPR, evaluations have been performed by TVA or nationally

recognized laboratories on those fire door assemblies that are not listed or labeled as fire rated door assemblies. TVA has ensured that the hardware and other components of fire door assemblies comply with NFPA 80 requirements or are appropriately evaluated. Specific attachments to fire doors, such as for security hardware, do not adversely impact on the fire rating of fire door assemblies as identified in Generic Letter 86-10. The quantity and location of fusible links on rolling/sliding fire doors is dependent on the fire hazards and other fire protection features provided (i.e. some doors may have only one link vs the code required three when combined with fire detection/suppression and/or low combustible loadings). See Part VII.

3.3.13 NFPA 194-1974: Fire Hose Connectors: NFPA 196-1974: Fire Hose

Fire Hose Connectors (NFPA 194) and Fire Hose (NFPA 196) address the acceptable connectors and materials for fire hose assemblies. Fire hoses and their connectors are visually inspected. Fire hose and connectors are expendable items. Replacement parts are purchased to the current standards at the time of purchase.

1.0 INTRODUCTION

Part VII documents deviations from TVA's commitments against applicable NRC regulatory criteria and guidance documents and presents engineering evaluations of the adequacy of specific fire protection features. Section 2.0 documents the history of the NRC approved deviations from the applicable sections of 10CFR50 Appendix R. Section 3.0 contains the SQN approved evaluations on the adequacy of fire protection features developed in accordance with the guidance of Generic Letters 83-33 and 86-10. Section 4.0 contains the justifications for deviations from the guidance of Appendix A to BTP 9.5-1. Section 5.0 contains deviations from the requirements of NFPA codes and standards that could impact on the operational capabilities of fire protection features. NFPA Code deviations that do not impact on operational capabilities are identified in Part VI.

2.0 DEVIATIONS TO 10CFR50 APPENDIX R

This section documents the history and technical justifications for the previously NRC approved deviations from the criteria of Appendix R. A total of 22 deviations are contained in this section. The deviations documented in this section include the following:

Appendix R, Section III.G.

1. Fire Detection and Suppression Systems Not Provided Throughout the Control Building
2. Component Cooling Water Pumps Not Properly Separated
3. Fire Dampers Not Provided for Post Accident Sampling Facility HVAC Duct Penetrations
4. Total Area Fire Suppression System Not Provided for Battery Inverter and Charger Rooms
5. Inadequate Separation Provided Between Emergency Raw Cooling Water (ERCW) Valves
6. Inadequate Separation Between Redundant Power Cables to Diesel Auxiliary Boards
7. Inadequate Separation Between Redundant ERCW and Fire Pump Cables
8. Unprotected Openings in Fire Barriers Separating ERCW Pumps
9. Unprotected Floor Openings in the Auxiliary Building
10. Unprotected Redundant Shutdown Circuits Located Within Shutdown Board Rooms
11. Protection of Intervening Combustibles Between Redundant Shutdown Cables Separated by More Than 20 Feet
12. Fire Detectors and Fire Suppression Systems Not Provided for All Plant Areas Containing Safe Shutdown Equipment
13. One Hour Raceways Do Not Extend Throughout the Fire Area
14. Manual Operation for Control Room Air Handling Unit
15. Inadequate Separation of ERCW Power Cables
16. Fire Rating of Equipment Hatch
17. One-Inch Mineral Wool Barriers in Lieu of One-Hour Fire Rated Barriers
18. Manual Sprinkler System and One-Hour Electrical Fire Barrier System Installed in the 125V Vital Battery Board Rooms I-IV

Appendix R, Section III.J.

SQN has no deviations for Section III.J.

Appendix R, Section III.L.

19. Process Monitoring Functions for (1) Condensate Storage Tank Level, (2) Refueling Water Storage Tank Level and (3) Wide Range Steam Generator Indication Not Provided Within Auxiliary Control Room

20. Auxiliary Control Room - T-Cold Instrumentation

Appendix R, Section III.O.

21. Non-Seismic Drain Piping from Each Reactor Coolant Pump Oil Collection System
22. Inadequate Size Drain Tank for Oil Collection System

NOTE: The above list is not arranged in the numerical order as approved by the NRC. Specific deviations should be referred to by the titles above and not by number. These deviations are presented in the form and tense found in the NRC approved safety evaluation requests. (ref. 2.0.1, 2.0.2, 2.0.3, 2.0.4)

References

2.0.1 **Letter to TVA from NRC, dated May 29, 1986 (L44 860606 620 or A02 860604 008)- Deviation Requests**

2.0.2 **Letter to TVA from NRC, dated November 4, 1988 (A02 881109 007)- Vital Battery Board Rooms I-IV Interim Deviation**

2.0.3 **Letter to TVA from NRC, dated October 6, 1986 (A02 861008 005)- T-Cold Deviation Request**

2.0.4 **Letter to TVA from NRC, dated June 30, 1989 (A02 890703 044)- Vital Battery Board Rooms I-IV Deviation Request**

The following sections present a summary of the NRC approved deviations and the bases for acceptability of the deviation requests. Modifications necessary to validate these deviations have been completed. These deviations are presented in the following format:

Title
Deviation Request
A summary of the deviation as requested by TVA
Discussion
The NRC discussion of the deviation
Evaluation
The NRC review of deviation
NRC Conclusion
The NRC conclusion and approval with reference to the NRC Safety Evaluation Report.
Deviation Updates
TVA updates to the deviation due to changes made under 10CFR50.59 and Generic Letter 86-10.

Table 2.0-1 contains the Process Control Requirements necessary for maintaining valid Appendix R Deviation Bases.

2.1. Fire Detection and Suppression Systems Not Provided Throughout the Control Building

2.1.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50 Appendix R, Section III.G.3 which requires fire detection and fixed fire suppression system in areas, rooms, or zones for which alternate shutdown capability is provided.

2.1.2 Discussion

The Control Building for which alternative shutdown capability is provided is a fire area separated from adjacent fire areas by construction features having an equivalent three-hour fire resistant rating. Fire detection is provided throughout the Control Building except for stairs C1 and C2 which are enclosed by construction having an equivalent fire resistant rating of 1 1/2 hours. Interior fire hose standpipe systems and portable extinguishers are provided throughout the building. Fixed fire suppression is provided throughout the building, except for the Main Control Room and several nonsafety-related rooms such as the stairs, corridors, battery rooms, and relay rooms which have low combustible fuel loading. The largest fuel load for the rooms which do not have a fire suppression system is 30,000 Btu/sq-ft. This equates to a fire severity of only 23 minutes. Alternative shutdown methods utilizing the remote alternative shutdown panel located in the Auxiliary Building is available in the event of a fire within the Control Building complex.

The licensee justifies the deviation based on the following: availability of the alternative shutdown capability to assure plant shutdown; three-hour separation provided between the Control Building and location of remote shutdown panel in the Auxiliary Building; low fire loading; complete fire detection coverage, except for stairs; fixed fire suppression systems for areas having appreciable combustible fuel loads; availability of interior fire hose and standpipe system and portable fire extinguishers; and, prompt response by the plant fire brigade which should assure that any fire will be extinguished quickly without major fire damage.

2.1.3 Evaluation

The Control Building is not in compliance with Appendix R, Section III.G.3 because fire detection and suppression systems are not provided throughout the Control Building for which alternative shutdown capability is provided. This protection is required to limit the severity of a fire such that normal shutdown components will receive minimal fire damage and the fire will not damage both the normal shutdown components and the alternative shutdown components. The Sequoyah Control Building is separated from the Auxiliary Building by construction features having a fire resistant rating equivalent to three-hours. This separation should assure that the alternative shutdown capability, which is located within the Auxiliary Building, will not be damaged by fire in the Control Building. The continuously manned control room, fire detection system provided for the Control Building, fixed fire suppression systems for areas having an appreciable combustible fuel load, the interior fire hose system and portable fire extinguishers should ensure early fire detection, and prompt fire brigade response and extinguishment in the event of fire. This should assure that major fire damage to normal shutdown components will be minimal.

2.1.4 NRC Conclusion

Based on our evaluation, we conclude that the fire protection features provided for the Control Building will achieve an acceptable level of protection equivalent to that required by Appendix R, Sections III.G.2 and III.G.3. Therefore, the licensee's deviation is granted.(ref. 2.0.1)

2.1.5 Deviation Update

Clarification to the original discussion, Section 2.1.2, involves the statement concerning the location of fixed fire suppression in the Control Building except for non-safety related areas, including the battery rooms. The battery rooms are actually safety-related areas, equipped with full automatic suppression and detection.

The Fire Severity Index of "Low " is henceforth utilized in lieu of exact combustible loading values (i.e., 30,000 Btu/sq-ft and 23 minutes). This fire severity limit applies to locations within the Control Building, except the continuously manned MCR, that do not have automatic suppression (see Table 2.1-1). Basis: Part II Definitions.

2.2 Component Cooling Water Pumps Not Properly Separated

2.2.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50 Appendix R, Section III.G.2.c which requires that one train of equipment necessary for safe shutdown be separated by a continuous one-hour fire rated barrier in addition to area protection by automatic fire detection and suppression systems.

2.2.2 Discussion

The five component cooling water system pumps are located adjacent to each other on elevation 690' of the Auxiliary Building. The two Train "B" pumps are separated from the two Train "A" pumps and the spare pump by a one-hour fire rated barrier which extends from the floor to three feet above the highest point of the pumps. The high ceiling height in this area is 23 feet and the large room volume is 429,000 cu. ft. A fire detection and automatic pre-action sprinkler system, activated by cross-zone fire detection system, are provided for this area. The combustible loading is 42,050 Btu/sq-ft. This is due to the cable insulation in open ladder type cable trays and the 66 gallons of lube oil associated with these pumps and two adjacent auxiliary feedwater pumps. The licensee proposes the following modifications:

- Relocate the raceways containing the redundant circuits for the pumps to afford a separation of 20 or more feet or to provide a one-hour fire barrier for one of the redundant circuit trains.

The licensee justifies the deviation for the lack of a one-hour fire barrier between the pumps due to: limited combustible fuel load; partial height fire barrier partition; high ceiling height and large room volume to dissipate thermal effects of a fire; early detection by area fire detectors; and, the provisions of a fixed fire suppression system.

2.2.3 Evaluation

The component cooling water pumps do not meet the separation and fire protection requirements of Appendix R, Section III.G.2 in that one pump train component is not separated from the redundant pump train components by construction features having a one-hour fire resistant rating. However, the redundant pumps are separated by a one-hour fire rated partial height partition wall; also, fire detection and automatic sprinkler protection are provided for the area. The combustible fuel load in the area is low and the high ceiling and large room volume should dissipate the thermal effects of a fire. The licensee is to provide modifications for the raceways containing redundant circuits for the pumps to separate these circuits by 20 or more feet or enclose the redundant circuits for one train within a one-hour fire barrier. The existing fire protection, and construction features, and completion of proposed modifications should provide sufficient

protection to assure that one shutdown train will remain free of fire damage in the event of a fire.

2.2.4 NRC Conclusion

Based on our evaluation, we conclude that upon completion of the proposed modification the fire protection features provided for the component cooling water pumps will achieve an acceptable level of protection equivalent to that required by Appendix R, Section III.G.2. Therefore, the licensee's deviation request is granted.(ref. 2.0.1)

2.2.5 Deviation Update

The Fire Severity Index of "Moderate" shall henceforth be utilized in lieu of the exact value for combustible loading (e.g. 42,050 Btu/sq-ft). This fire severity limit applies to room 690-A01 within the Auxiliary Building. Basis: Part II Definitions, the automatic suppression provided in this large room area with high ceilings, the partial height fire wall and separation/ERFBS provided for required circuits above the elevation of the partial height fire wall.

2.3 Fire Dampers Not Provided for PASF HVAC Duct Penetration

2.3.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50 Appendix R, Section III.G.2.a which requires that redundant shutdown components be separated by a fire barrier having a three-hour rating.

2.3.2 Discussion

The walls and floors of the Auxiliary Building gas treatment fan room are equivalent to three-hour rated barriers, but post-accident sampling facility HVAC duct penetrations through these barriers do not have fire dampers as required to prevent passage of smoke and fire through the fire barriers.

Each gas treatment fan room is a fire zone which contains safe shutdown components and is separated from one of the two sampling facility rooms and from the nitrogen storage room by reinforced concrete construction equivalent to three-hour fire-rated barriers. The Unit 1 gas treatment fan room has two 12-inch, one 10-inch, and one 8-inch round HVAC ducts that passes through it for a short distance. The Unit 2 gas treatment fan room is similar except there are one 12-inch, one 10-inch, and one 8-inch round ducts passing through it. One 12-inch duct ties into each of the filter systems in the rooms. These ducts are seismically supported. Pipe sleeves are provided where the ducts penetrate the barrier walls. The annular space between the sleeves and the pipes are sealed with silicon foam which was installed per manufacturer's instructions.

The only significant in-situ combustibles in the fire area including the sampling facility and nitrogen storage rooms are two charcoal filter units located in the nitrogen storage room. This equates to a combustible loading of 780 Btu/sq-ft. These rooms are provided with fire detectors and the sampling room has an automatic sprinkler system. Interior fire hose stations and portable fire extinguishers are also available.

Fire barrier tests conducted by two testing laboratories, Underwriters Laboratories, Inc. and Factory Mutual, involving schedule 40 pipe ducts and silicon foam installed similar to the installation at this location satisfactorily passed a three-hour fire endurance test. Due to the low fire loading in these rooms, the licensee's analysis assumes that the pipe ducts for this installation should likewise not fail.

TVA justifies this deviation based on the following: low combustible fuel load within the area; and, fire detection and fixed fire suppression systems installed to provide early fire warning and extinguishment. Also, the pipe ducts used in the HVAC fire tests did not fail; therefore, since the installed HVAC pipe ducts are similar to those tested, they likewise should not fail. The only effect of a fire in one of the sample facility rooms or in the nitrogen storage room which could be expected in the ABGTS room would be radiant heat due to hot gases passing through the ducts. The absence of fixed combustibles in the immediate area of the ducts provides a high degree of assurance that this radiant heat will not be a threat to safe shutdown components located in the gas treatment fan room.

2.3.3 Evaluation

The post-accident sampling facility rooms which contain safe shutdown components are not in compliance with Appendix R Section III.G.2.a because the HVAC duct penetrations through the three-hour fire barriers are not provided with three-hour fire rated dampers.

The HVAC duct penetrations through the fire barriers are schedule 40 pipe. Fire tests by two testing laboratories found that pipes installed in this configuration would withstand a three-hour fire test. Therefore, it appears that duct pipes in this location should also endure a three-hour fire situation. Furthermore, the fire loading in the rooms under consideration is low and the installed fire detection and suppression systems within the area should assure early detection and extinguishment in the event of fire. The construction features and fire protection systems provided for these rooms under consideration should prevent damage to redundant shutdown trains and assure that one train will remain free of fire damage in the event of fire.

2.3.4 NRC Conclusion

Based on our evaluation, we conclude that the construction and fire protection features provided for the post-accident sampling facility rooms achieve an acceptable level of protection equivalent to that required by Appendix R Section III.G.2.a; therefore, the licensee's deviation is granted.(ref. 2.0.1)

2.3.5 Deviation Update

Section 2.3.3 states that the PASF rooms contain safe shutdown components. A clarification to the statement is that the safe shutdown components exist in the ABGTS rooms, which also house the PASF rooms. The Fire Severity Index of "Low" is henceforth utilized in lieu of the specific combustible loading value (i.e., 780 Btu/sq-ft). This fire severity limit applies to rooms 706-A06, 706-A08 and 706-A09 within the Auxiliary Building. Basis: Part II Definitions.

Fire detection has been installed to make the PASF sprinkler system automaticref: SQ962075PER).

2.4 Total Area Fire Suppression System Not Provided for Battery Inverter and Charger Rooms

2.4.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50 Appendix R, Section III.G.2 which requires fire detection and automatic fire suppression systems in areas containing redundant safe shutdown equipment that is separated by less than three-hour fire rated construction.

2.4.2 Discussion

Rooms 749.0-A2 and 749.0-A15 contain redundant vital battery inverters and charges and the

trained reactor vent and motor operated valve (MOV) boards for Units 1 and 2, respectively. The portion of the rooms between column lines A6-A8/q-r and A8-A10/q-r are not covered by a sprinkler system.

These rooms are separated from each other and other areas of the Auxiliary Building elevation 749.0 by reinforced concrete walls which are equivalent to at least a 1 1/2 hour barrier. This is an adequate level of separation considering the combustible loading of the two rooms and has previously been accepted by NRC in an SER dated February 1980.

The only in-situ combustible located in the area without suppression is the insulation on the cables inside the inverters and chargers. A pre-action sprinkler system actuated by cross-zoned ionization smoke detectors covers the remainder of each room. The smoke detection system is provided throughout the area including the area not having the suppression system. Inadvertent operation of a sprinkler system would cause unacceptable damage to the inverters and battery chargers. Standpipe and hose systems and portable extinguishers are also provided in the rooms.

2.4.3 Evaluation

The fire protection features provided for the battery inverter and charger rooms 749.0-A2 and A15 do not meet the technical requirements of Appendix R Section III.G.2 in that portions of these rooms are not covered by an automatic sprinkler system. These rooms are separated from each other and other areas of Auxiliary Building evaluation 749 by construction which has an equivalent fire resistant rating of 1 1/2 hours. This separation appears sufficient based on the low fire loading and suppression system provided. These areas were found acceptable during a previous NRC review as documented in the SER of February 1980. The unsprinklered areas of these rooms were not provided with sprinkler protection due to concern that inadvertent operation of a sprinkler system would cause unacceptable damage to the inverters and battery chargers. However, these areas are provided with automatic smoke detectors which should in the event of fire, provide prompt notification for early extinguishment by the plant fire brigade. The fire protection features provided should assure that one safe shutdown train would remain free of damage in the event of fire.

2.4.4 NRC Conclusion

The NRC concluded the fire protection features provided for the battery inverter and charger rooms provide an acceptable level of protection equivalent to that required by Appendix R III.G.2 and the deviation is granted.(ref. 2.0.1)

2.4.5 Deviation Update

Standpipe and hose systems are provided near these rooms in lieu of being located inside of these rooms. Basis: Hose stations are located on Elevation 749.0' to allow manual fire suppression activities. Standpipes are not located in these rooms, but are accessible for use in these rooms.

2.5 Inadequate Separation Provided Between Emergency Raw Cooling Water (ERCW) Valves

2.5.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50 Appendix R, Section III.G.2.b which requires that cables and equipment and associated nonsafety circuits of redundant trains are to be separated by a horizontal distance of more than 20 feet with no intervening combustibles of fire hazards. In addition, fire detector and automatic fire suppression systems are required to be installed in the area.

2.5.2 Discussion

ERCW valves 1 and 2 - FCV-67-146 are only 15 feet and 8 feet respectively from their redundant counterpart auxiliary power circuits. These valves are located in the discharge header of the component cooling water system heat exchangers and are located above a mezzanine in room 714.0-A1 of the Auxiliary Building. The only undesirable condition that could result from a transient combustible fire in the mezzanine area is for the valves to spuriously close. However, the component cooling water system must only supply cooling water to a small amount of equipment required for safe shutdown during a fire and TVA has determined that these valves may remain closed for up to two hours. This is sufficient time to manually open any of the valves which might have spuriously closed.

The room is provided with fixed automatic sprinkler systems actuated by ionization smoke detectors. Standpipe and hose stations and probable extinguishers are also provided for this area. The licensee has provided additional sprinkler heads under the mezzanine.

The in-situ combustible loading for this room is 114,500 Btu/sq-ft and the remaining 1000 Btu/sq-ft is due to lube oil in various water chillers and pumps located throughout the room. None of the chillers or pumps are located under these valves. The existing ceiling level sprinklers will provide direct water impingement on the valves.

The licensee justifies the deviation for the inadequate separation between the ERCW valves based on the lack of combustible material beneath the valves and due to the fire protection features provided for this area. Also, should these valves spuriously close they may remain closed for up to two hours without introducing any safety concerns. This is sufficient time to permit fire extinguishment and to manually reopen any of the valves which may have closed. This should assure that the plant may be safely shutdown in the event of fire.

2.5.3 Evaluation

The separation between two of the redundant ERCW valves does not meet the technical requirements of Appendix R, Section III.G.2.b in that the valves are separated by less than 20 feet from their redundant counterpart auxiliary power circuits. The valves and auxiliary power circuits are located above a mezzanine. Fire detection and automatic sprinkler protection is provided at the ceiling and beneath the mezzanine. The combustible fuel load in the area is low and minimal combustible materials are located beneath the mezzanine. The licensee's analysis indicates that even if these valves should spuriously close, they may remain closed for up to two hours without introducing any safety concerns. This should be sufficient time to permit fire extinguishment and to manually reopen any valve that may have spuriously closed. The existing fire detection and sprinkler systems and proposed modifications to the sprinkler system should assure that no major damage would occur in the event of fire and safe plant shutdown should be accomplished.

2.5.4 NRC Conclusion

Based on our evaluation, we conclude that upon completion of the proposed modifications, the fire protection features provided for these ERCW valves will achieve an acceptable level of fire protection, if the valves spuriously close they may remain closed for up to two hours without introducing any safety concerns. This is sufficient time to permit fire extinguishment and to manually reopen any of the valves which may have closed. This should assure that the plant may be safely shutdown in the event of fire.(ref. 2.0.1)

2.5.5 Deviation Update

The Fire Severity Index of "Moderate" is henceforth utilized in lieu of the exact combustible loading values (i.e., 114,500 Btu/sq-ft and 100 Btu/sq-ft). The fire severity is "Moderate" due to lube oil in various water chillers and pumps. This fire severity limit applies to room 714-A01 within the Auxiliary Building. Basis: Part II Definitions.

2.6 Inadequate Separation Between Redundant Power Cables to Diesel Auxiliary Boards

2.6.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50 Appendix R, Section III.G.2.b which requires that fire detection and automatic suppression be installed in the area where separating cables, equipment, and associated nonsafety circuits of redundant trains are separated by a horizontal distance of more than 20 feet.

2.6.2 Discussion

Cables 1PL4982B and 1PL4985B (normal supply or 480V Diesel Auxiliary Boards 1B1-B and 1B2-B, respectively) are routed in trays on the refueling floor that are 32 feet from trays containing redundant cables 2PL4975A and 2PL4978A (normal supply for 480V Diesel Auxiliary Boards 2A1-A and 2A2-A, respectively). An automatic fire detection system is provided for this area, but there is no fixed suppression system in this room. These cables are located 54 feet above the floor.

2.6.3 Evaluation

The separation between the redundant power supplies to four of the diesel auxiliary boards does not meet the technical requirements of Appendix R, Section III.2.b in that, these redundant power cables are located within the same fire area, separated by more than 20 feet with a fire detection system provided for the area, but no fixed fire suppression system is provided as required.

These redundant cables are located in trays approximately 32 feet apart and 54 feet above the floor. A fire detection system is provided which should provide warning of fire for early detection and suppression by the plant fire brigade using the available portable fire extinguishers and interior fire hose system. Due to the low combustible fuel loading, large room area, high ceiling and fire detection system, a fire within this area should be detected and extinguished prior to both trains being damaged by fire.

2.6.4 NRC Conclusion

Based on our evaluation, we conclude that the construction and fire protection features provided for the refueling floor and these power supply cables provide an acceptable level of protection equivalent to that required by Appendix R, Section III.G.2; therefore, the licensee's deviation request is granted.(ref. 2.0.1)

2.6.5 Deviation Update

The Fire Severity Index of "Low" is utilized for the refuel floor. This fire severity limit applies to room 734-A13 within the Auxiliary Building. Basis: Part II Definitions.

2.7 Inadequate Separation Between Redundant ERCW and Fire Pump Cables

2.7.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50 Appendix R, Section III.G.2 which requires redundant safe shutdown components to be separated from each other by one of the following methods:

- Separation of cables and equipment and associated nonsafety circuits of redundant trains by a fire barrier having a three-hour rating.

- Separation of cables and equipment and associated nonsafety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.

- Enclosure of cable and equipment and associated nonsafety circuits of one redundant train in a fire barrier having a one-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.

2.7.2 Discussion

Power cables for both redundant divisions for the ERCW pumps, fire pumps, ERCW pumping station transformers, and related circuits are routed in a conduit bank through a corner of the refueling water storage tank (RWST) pipe chase and over the suspended ceiling in the counting room between column lines C1-A1/t-u on elevation 690.0. The Train A circuits are routed in half of the conduits and Train B circuits are routed in the other half of the conduits. These conduits do not have adequate spatial or barrier separation, or a complete fire suppression system.

The RWST pipe chase is enclosed by reinforced concrete construction that is equivalent to three-hour fire-rated barriers, except for the end that opens into the Auxiliary Building. There are no in-situ combustibles located in the pipe chase.

Access limitations ensure that transient combustibles in the pipe chase will be negligible. Access to the pipe chase normally requires a Radiation Work Permit (RWP) which controls access and work activities in the chase. Access to the chase is up a ladder and across the roof of the turbine driven auxiliary pump room. The automatic sprinkler system for elevation 669.0 of the Auxiliary Building protects the entrance of the chase from an exposure fire in the Auxiliary Building.

The fire load for the Radio-Chem Lab and Counting Room (RCL-CR) is low (less than 6 lb/sq-ft). The rooms are provided with preaction sprinklers actuated by cross-zoned ionization smoke detectors. In addition, a standpipe and hose system and portable extinguishers are provided throughout the plant. The RCL-CR is continuously manned, and any fire in this area should be detected quickly and extinguished.

To further ensure that a fire in the RCL-CR will not damage circuits routed in these conduits, TVA has proposed the following modifications:

- Installation of a sprinkler system to cover the area above the suspended ceiling in the CR.

- Installation of smoke detectors above the ceiling area to actuate the suppression system.

This part of the suppression system will provide direct water impingement on the conduits and will also cool the hot gases from a fire.

The licensee's analysis justifies this deviation request based on the low combustible fuel load in the area, and the existing and proposed fire detection and suppression systems which in the event of fire should provide early fire detection for fire brigade suppression or suppression by the automatic sprinkler system.

2.7.3 Evaluation

A number of redundant shutdown related cables located on elevation 690 of the Auxiliary Building do not meet the technical provisions of Appendix R, Section II.G.2 due to the lack of required spatial or barrier separation or complete fixed fire suppression coverage.

These cables are located within a pipe chase which is void of combustibles, access to which will be controlled by a radiation work permit, and are located in a concealed space in the ceiling above the chemistry laboratory. The laboratory is provided with a pre-action sprinkler system activated by as smoke detector system. The combustible fuel load within the laboratory is low. To provide additional protection for the cables within the concealed ceiling space above the laboratory, the licensee has proposed to provide sprinkler and detector coverage for the space. The low fuel load in these areas and the existing and proposed fire detection and sprinkler systems for the laboratory area should provide sufficient protection to assure that one safe shutdown train will remain free of fire damage in the event of fire.

2.7.4 NRC Conclusion

Based on our evaluation, we conclude that upon completion of the proposed modifications, the fire protection features provided for this portion of the Auxiliary Building will achieve an acceptable level of protection equivalent to that required by Appendix R, Section III.G.2. Therefore, the licensee's deviation request is granted.(ref. 2.0.1)

2.7.5 Deviation Update

The Fire Severity Index of "Low" is utilized in lieu of less than 6 lb/sq-ft. This fire severity limit applies to FAA-030 (collectively rooms 690-A02, 690-A03, 690-A04, and 690-A05) within the Auxiliary Building. Basis: Part II Definitions.

2.8 Unprotected Openings in Fire Barriers Separating ERCW Pumps

2.8.1 Deviation Request

TVA requested deviation from the technical provisions of 10CFR50 Appendix R, Section III.G.2 which requires redundant safe shutdown components to be separated from each other by one of the following methods:

- Separation of cables and equipment and associated nonsafety circuits of redundant trains by

a fire barrier having a three-hour rating.

- Separation of cables and equipment and associated nonsafety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.

- Enclosure of cable and equipment and associated nonsafety circuits of one redundant train in a fire barrier having a one-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.

2.8.2 Discussion

Redundant safe shutdown circuits located in the ERCW pumping station are not separated in literal compliance with the requirements. There are unprotected openings in the interior walls of the pumping station and the roof of the building is of open grating type construction.

The ERCW pumping station is separated into three compartments by reinforced concrete construction that is equivalent to three-hour fire-rated barriers. Four Train B pumps are located in the center compartment with two Train A pumps in each of the outer compartments. In-situ combustibles in each of the compartments consist of 39 gallons of lubricating oil within each pump and three gallons of lubricating oil within each traveling screen motor. The lubricating oil has a flashpoint of 432F making it difficult to ignite in an unconfined spill.

There are two 6-inch diameter scupper holes and one 30-inch by 20-inch hole for a trash sluice in each of the two interior walls that separate the redundant pumps. The floors in the outer compartments are sloped so that normal drainage flows away from the inner walls and flammable liquid from a spill will drain into the gutters within the respective compartments. A flammable liquid spill in the center compartment would enter the gutters and drain to the sump without entering the outer compartments. The open roof configuration would dissipate the heat from a fire, thereby eliminating any significant heat transfer to any of the adjacent compartments.

The trash sluice is of steel construction on three sides and covered with open grating except where the traveling screens discharge into the sluice. The sluice is enclosed on all four sides at these locations. The sluice runs from the northernmost compartment through a 20-inch by 30-inch opening in both interior fire rated barriers and leaves the building through the exterior south wall where it discharges into a 36-inch diameter downspout.

The traveling screens are each capable of discharging a maximum of three gallons of lubricating oil into the trash sluice. The possibility of the oil igniting is improbable due to its high flashpoint (432F). However, if the oil was ignited, it would be contained while traveling down the sluice and would discharge into the downspout. The thermal effects of this type of fire would be dissipated through the open grating roof and would not pose an unacceptable threat to the pumps.

Smoke detectors are provided within each electrical equipment room and a heat detector is located above each ERCW pump. Interior fire hose stations and portable fire extinguishers are provided for the pumping station.

TVA's justification for this deviation is based on the above construction features which should prevent fire damage to redundant pumps. Thus, one train would be available for plant shutdown.

2.8.3 Evaluation

The ERCW pumps are not separated as required by Appendix R, Section III.G.2 due to several small scupper holes and a small trash sluice in the fire barrier walls between the redundant pumps. As noted in the above discussion, the construction of the floors should prevent a flammable or combustible liquid spill from involving both pump trains. The flashpoint of the lubricating oil associated with the equipment in the pump station is high (432°F) which makes ignition from an oil spill very improbable. However, if the oil from a spill did ignite, the oil would be contained within the drainage system and the thermal effects of the fire would be dissipated through the open roof grating.

The construction features provided for the pump station should, even in the event of fire, provide sufficient protection to assure that one ERCW pump train would remain free from fire damage.

2.8.4 NRC Conclusion

Based on our evaluation, we conclude that the construction features provided for the ERCW pumping station provide an acceptable level of protection equivalent to that required by Appendix R, Section III.G.2 and the licensee's deviation request is granted.(ref. 2.0.1)

2.8.5 Deviation Update None

2.9 Unprotected Floor Openings in the Auxiliary Building

2.9.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50 Appendix R, Section III.G.2.b which requires redundant safe shutdown components to be separated from each other by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.

2.9.2 Discussion

Floor slabs in the Auxiliary Building necessary to separate redundant safe shutdown components have unprotected penetrations. Consequently, some redundant safe shutdown components that are separated by these floor slabs may not be in literal compliance with the separation requirements of Appendix R, Section III.G.2.b.

The Auxiliary Building is a designated fire area and is separated from adjacent fire areas by reinforced concrete construction that is equivalent to 3 hour fire rated enclosures. The Auxiliary Building is further divided into 1 1/2 hour fire rated enclosures. However, not all floor slabs within the Auxiliary Building are designated as complete fire barriers. They are constructed of reinforced concrete that is equivalent to three-hour fire-rated barriers, except for equipment hatch openings, stairwells, unsealed spare conduit sleeves, and unprotected HVAC duct penetrations. All other floor penetrations have an equivalent three-hour fire seal. Unprotected floor penetrations in the vicinity of redundant safe shutdown components are proposed to be protected by the following modifications:

- Stairwells - A water curtain designed in accordance with NFPA 13, Section 4-4.8.2 will be provided for stairwell openings located near column lines A4/S and A12/S through floor slabs 690.0 and 714.0.

- HVAC ducts - Redundant safe shutdown components located on different elevations near

unprotected HVAC ducts will be separated in accordance with Appendix R, Section III.G.2.

- Conduit penetrations - Spare conduit sleeves are to be capped on each end by threaded conduit plugs to prevent flames or hot gases from propagating through these capped sleeves. All other conduits that pass through required floors are to be sealed.

These modifications will ensure that no single fire can expose more than one train of safe shutdown components located on different elevations.

The rooms containing the required safe shutdown components that are separated from their redundant counterparts by the floor slabs are protected by fire detection and automatic fire suppression systems. In addition, standpipe and hose systems and portable extinguishers are also provided.

TVA's justification for this deviation is based on the position that after the above described modifications are complete, the level of protection that will be achieved by locating redundant safe shutdown components on different elevations is equivalent to the separation requirements of Appendix R, Section II.G.2.b.

2.9.3 Evaluation

The redundant safe shutdown components on different floor elevations of the Auxiliary Building are not separated as required by Appendix R, Section III.G.2 due to unprotected penetrations in the floor slabs between each elevation. However, as noted above, the licensee has proposed to provide additional protection for these openings. Sprinkler system water curtains will be provided for the open stair shafts. Conduit penetrations will be sealed, and redundant equipment adjacent to HVAC ducts will be relocated to provide the required separation. Upon completion of these modifications, the protection provided by construction of the floor slabs and protection afforded by the floor openings should provide sufficient protection to assure that one safe shutdown train will remain free from fire damage in the event of fire.

2.9.4 NRC Conclusion

Based on our evaluation, we conclude that upon completion of the proposed modifications, the fire protection features provided for the open floor penetrations within the Auxiliary Building will achieve an acceptable level of protection equivalent to that required by Appendix R, Section III.G.2. Therefore, the licensee's deviation request is granted.(ref. 2.0.1)

2.9.5 Deviation Update None

2.10 Unprotected Redundant Shutdown Circuits Located within Shutdown Board Rooms

2.10.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50 Appendix R, Section III.G.2.c which requires that cables and equipment and associated nonsafety circuits of one redundant train be enclosed in a fire barrier having a one-hour rating and that fire detectors and an automatic fire suppression system be installed in the fire area.

2.10.2 Discussion

Train A safe shutdown circuits are routed in trays that pass through 480V shutdown board room 1B2-B, and Train B safe shutdown circuits are routed in trays that pass through 480V shutdown board room 2A2-A. These redundant circuits are not enclosed in a fire barrier having a one-hour rating.

The Auxiliary Building is a designated fire area and is separated from adjacent fire areas by reinforced concrete construction that is equivalent to three-hour fire rated barriers. The 480V shutdown board rooms are separated from adjacent rooms in the Auxiliary Building by reinforced concrete construction that is equivalent to 1 1/2 hour fire-rated barriers.

The in-situ combustible loadings within 480V shutdown board room 1B2-B is 152,496 Btu/sq-ft and within 480V shutdown board room 2A2-A is 158,136 Btu/sq-ft. This is due to the insulation on the cables in trays. The licensee proposes the following modification to assure that an internally generated cable tray fire will not be creditable:

- Provision of circuit protective devices (breakers and fuses) that will clear a fault on a cable before the cable insulation reaches its auto-ignition temperature.

Therefore, the threat to the cables would have to be from an exposure fire due to transient combustibles. The type and quantity of transient combustibles allowed through these rooms are minimized by plant procedures. If transient combustibles were present and did ignite, the fire would be detected by the ionization smoke detectors and extinguished or controlled by the fixed automatic suppression systems in the rooms or by the plant fire brigade. However, to further ensure that a transient combustible fire will not damage both redundant trains of circuits, the licensee proposes the following modification:

- Installation of open head automatic water spray systems for the protection of Train A trays located in 480V shutdown board room 1B2-B and the Train B trays located in 480V shutdown board room 2A2-A. Each system will be actuated by a line type thermal fire detection system. The line type thermal detectors will be located at the top and the bottom of the protected stack of trays.

To enclose the cable trays within a one-hour fire-rated barrier would require major modifications to large HVAC ducts and their supports, fire protection piping and supports, and cable tray supports.

TVA's justification of this deviation is based on the position that the addition of the open head water spray systems will provide a level of protection that will adequately address the hazards present and ensure that one train of redundant safe shutdown circuits will remain free of fire damage.

2.10.3 Evaluation

The Train A and B 480V shutdown board rooms do not meet the technical requirements of Appendix R, Section III.G.2.c in that these rooms contain safe shutdown circuits from the redundant train which are not enclosed within a one-hour fire-rated barrier.

The licensee's analysis indicated that enclosing the raceways containing the redundant shutdown circuits would require major modifications to large HVAC ducts, fire protection piping and cable trays. In lieu of providing this enclosure, the licensee proposes the installation of an open head automatic water spray system for the raceways in each shutdown board room which contain redundant shutdown circuits. This water spray system in conjunction with the existing area fire detection and fire suppression system should assure that one shutdown train will remain free from fire damage in the event of a fire within one of the shutdown board rooms. In addition, the provision of the circuit protective devices should eliminate the potential of a fire from auto-ignition of the cables.

2.10.4 NRC Conclusion

Based on our evaluation, we conclude that, upon completion of the proposed modifications, the fire protection features provided for the 480V shutdown board rooms will achieve an acceptable level of protection equivalent to that required by Appendix R, Section III.G.2.c. Therefore, the licensee's deviation request is granted.(ref. 2.0.1)

2.10.5 Deviation Update

The Fire Severity Index of "Moderately Severe" is utilized in lieu of the in-situ combustible loadings within the 480V shutdown board room 1B-B of 152,496 Btu/sq-ft and within the 480V shutdown board room 2A-A of 158,136 Btu/sq-ft. This fire severity limit applies to rooms 734-A05 and 734-A21 within the Auxiliary Building. Basis: Part II Definitions.

2.11 Protection of Intervening Combustibles Between Redundant Shutdown Cables Separated by More than 20 Feet

2.11.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50 Appendix R, Section III.G.2.b which requires that cables, equipment and associated nonsafety circuits of redundant trains be separated by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards and that fire detectors and an automatic fire suppression system shall be installed in the fire area.

2.11.2 Discussion

The Auxiliary Building has open ladder-type cable trays located between redundant cables that are or will be separated by more than 20 feet. The insulation on cables in these trays is considered an intervening combustible material.

The locations in the Auxiliary Building where redundant cables are spacially separated have no significant in-situ fire hazards present except for the cable insulation in the cable trays. Fuse and breaker coordination provides adequate protection to clear any electrical fault from a cable before its insulation reaches its auto-ignition temperature. Therefore, an internally generated cable tray fire is not considered a credible event. An exposure fire at the floor represents the only significant fire hazard for the redundant cables.

The presence of the intervening cable trays between redundant cables is a concern for two reasons. First, the exposure fire could ignite the insulation which would add to the fire's thermal plume. Second, they could provide a path for the fire to propagate from one train of redundant cables to the other. TVA addresses both concerns by relying on the ceiling level sprinkler systems and supplemental sprinkler protection provided to compensate for the intervening combustibles.

Sprinkler coverage has been provided at the ceiling in the rooms where redundant circuits are spatially separated. These sprinklers will release large quantities of water in well developed patterns at the ceiling during a fire. The cooling effect of this water will prevent the formation of a heat plume and will control room temperatures until the fire brigade can respond and extinguish the fire.

The licensee has developed criteria for proposed use in the evaluation of the existing installed sprinkler systems to verify that the systems will provide sufficient coverage at the floor level. The licensee proposes to provide additional sprinkler coverage when appreciable obstructions to the discharge pattern exist, as outlined by the sprinkler system acceptance criteria.

The objective of the sprinkler system acceptance criteria is to provide compensation for the lack of a horizontal distance of more than 20 feet free of intervening combustibles between redundant divisions. This compensation is provided by installing supplemental sprinkler protection for floor level combustibles when adequate coverage by ceiling level sprinklers cannot be verified. This criteria shall be applied as follows when redundant divisions are separated by horizontal space and more than 20 continuous feet of the space is not free of intervening combustibles.

- If the redundant divisions are greater than 30 feet apart, the criteria shall be applied to any continuous 30-feet-wide path located between the redundant divisions.

- If the redundant divisions are greater than 20 feet but less than 30 feet apart, the criteria shall be applied to the entire horizontal space between divisions.

TVA justifies this deviation request based on the position that existing sprinkler systems coupled with additional sprinkler coverage resulting from the above criteria will provide a level of protection that adequately compensates for the presence of intervening combustibles located between spacially separated redundant safe shutdown cables and that the intent of Appendix R, Section III.G.2.b will be satisfied.

2.11.3 Evaluation

Shutdown related cable raceways for Trains A and B in the Auxiliary Building are to be separated by more than 20 feet, but the area between the raceways is not free of intervening combustibles as required by Appendix R, Section III.G.2.b due to installation of open ladder-type cable trays which contain cable insulation that is considered combustible.

To compensate for the intervening combustibles, the licensee proposes to rely on the existing ceiling level sprinkler systems with supplemental sprinkler systems to be provided for areas where the ceiling level system is not considered effective as noted in the above discussion section. The proposed modifications will assure adequate sprinkler coverage for the horizontal area between redundant shutdown trains from either the ceiling level sprinkler systems or from a combination of the ceiling level systems and the proposed supplemental systems to be provided for areas which contain obstructions. These systems should prevent fire spread that could involve both redundant shutdown trains. Therefore, at least one shutdown train should remain free from fire damage in the event of fire.

2.11.4 NRC Conclusion

Based on our evaluation, we conclude that, upon completion of the proposed modifications, the fire protection afforded by the ceiling level sprinklers and the proposed supplemental sprinkler systems will achieve an acceptable level of protection equivalent to that required by Appendix R, Section III.G.2.b. Therefore the licensee's deviation request is approved.(ref. 2.0.1)

2.11.5 Deviation Update None

2.12 Fire Detectors and Fire Suppression Systems Not Provided for All Plant Areas Containing Safe Shutdown Equipment

2.12.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50 Appendix R, Section III.G.2 which requires that fire detectors and automatic fire suppression systems be provided throughout areas containing redundant safe shutdown equipment which is separated by less than three-hour fire-rated construction.

2.12.2 Discussion

Within the Auxiliary Building, a number of rooms or portions of rooms do not have the required detection and/or suppression systems.

The licensee's evaluation found that none of these rooms contain components or cabling for both redundant shutdown trains. The analysis indicates that for the rooms with rated walls of less than three hours, the fixed combustible loading will yield a fire severity that is less than one half the rating of the room enclosures. In rooms without rated walls, the construction of the walls is of reinforced masonry block which is equivalent to at least 1 1/2 hours, but wall penetrations have not been provided with fire-rated doors, fire dampers, or qualified fire-rated seals. However, these rooms contain no appreciable amounts of in-situ combustibles.

Standpipe and hose stations and portable extinguishers are provided throughout the Auxiliary Building for use in those areas in the event of fire.

TVA justifies this deviation based on the low combustible loading and small size of the rooms, which thus do not pose a significant fire exposure hazard to redundant safe shutdown cables or equipment in the Auxiliary Building.

2.12.3 Evaluation

A number of rooms or portions of rooms within the Auxiliary Building are not provided with fire detection and/or automatic fire suppression systems as required by Appendix R, Section III.G.2. The licensee analysis indicates that the combustible fuel load for these rooms is low, the rooms are of relatively small area and do not present a significant fire exposure hazard to redundant safe shutdown components and cabling. A fire within any of these rooms should be detected by the fire detection equipment in adjacent areas within sufficient time to permit fire brigade response and fire extinguishment prior to damage to both shutdown trains.

2.12.4 NRC Conclusion

Based on our evaluation, we conclude that the fire protection features provided for these areas afford an acceptable level of protection equivalent to that required by Appendix R, Section III.G.2 and the licensee's deviation request is granted.(ref. 2.0.1)

2.12.5 Deviation Update

None of these rooms (or the portion of the room without detection/suppression) contain components or cabling for both redundant shutdown trains. The Fire Severity Index of Low or below is utilized for the rooms listed in Table 2.12-1 that do not have the required detection and/or suppression systems. Additionally, no appreciable amounts of in-situ combustibles shall be located in the rooms identified in Table 2.12-1 that are not fire rated compartments (individually or jointly with adjacent rooms in the table). The portion of rooms that do not have the required detection and/or suppression systems and are part of larger rooms with appreciable in-situ fire loading are identified in Table 2.12-2. The fire severity limit applicable to these rooms is listed in Table 2.12-2. Additionally, no appreciable amounts of transient combustibles shall be stored within the portion of these rooms without automatic suppression. Basis: Part II Definitions, original deviation request dated December 18, 1984 (L44841218800), and current FHA & compartmentation drawings.

2.13 One Hour Raceways Do Not Extend Throughout the Fire Area

2.13.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50 Appendix R, Section III.G.2 which requires redundant safe shutdown components to be separated from each other by one of the following methods:

- Separation by a fire barrier having a three-hour rating.

- Separation by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards and provisions of fire detection and automatic fire suppression systems within the fire area.

- Enclosure of one redundant shutdown train in a fire barrier having a one-hour rating and providing fire detection and automatic fire suppression systems within the fire area.

2.13.2 Discussion

Raceways containing redundant shutdown circuits in the Auxiliary Building that are not separated by a horizontal distance of 20 feet or more are enclosed in a one-hour fire-rated barrier until a 20-foot separation is attained. This is not in literal compliance with Appendix R, Section III.G.2 which requires the raceway fire barrier to extend throughout the fire area.

In the locations of the Auxiliary Building where redundant cables are protected by a one-hour fire-rated barrier until 20-foot separation is attained, there are no significant in-situ fire hazards present, except for cable insulation in the cable trays. Fuse and breaker coordination provides adequate protection to clear any electrical fault from the cables before its insulation reaches the auto-ignition temperature. Therefore, an internally generated cable tray fire that could affect both redundant shutdown trains is not considered a credible event. An exposure fire at the floor represents the only significant fire hazard for the redundant cables. Sprinkler coverage is provided at the ceiling in the rooms where partial one-hour fire-rated barriers are installed. These sprinklers will release large quantities of water in well developed patterns at the ceiling during a fire. The cooling effect of this water will prevent the formation of a heat plume and will control room temperatures until the fire brigade can respond and extinguish the fire using the standpipe and hose stations and portable extinguishers provided through the Auxiliary Building. For areas where intervening cable trays are located between the unwrapped portions of the redundant circuits (separation greater than 20 feet), the licensee proposes to provide additional sprinklers.

The licensee's justification for this deviation is based on the position that the one-hour fire-rated barrier wrap for the cable raceways terminates within an area provided with automatic sprinkler protection which in conjunction with the 20 feet of separation between trains provides equivalent protection to that stipulated by Appendix R, Section III.G.2.b.

2.13.3 Evaluation

Redundant shutdown cable raceways within the Auxiliary Building do not meet the technical provisions of Appendix R, Section III.G.2 because the one-hour fire barriers provided for the separation of one of the redundant raceways terminate within the same fire area in which the other raceways are located. The fire barriers are required to protect one redundant shutdown train through the entire fire area.

A number of raceways within the Auxiliary Building are enclosed within a one-hour fire-rated barrier. The fire barrier is provided for the raceway only until a 20 foot separation is attained. At this location, ceiling level sprinkler protection is provided. The licensee proposes to provide additional sprinkler coverage for areas in which there is appreciable obstructions to the discharge from the ceiling level sprinklers. Also, additional sprinklers are to be provided for the areas where intervening cable trays are located between the unwrapped portions of the redundant circuits. The fire barriers provided for the redundant raceways, the existing ceiling level sprinkler system, and the installation of the proposed supplemental sprinklers should provide sufficient protection to assure that one shutdown train will remain free from fire damage in the event of a fire within the Auxiliary Building.

2.13.4 NRC Conclusion

Based on our evaluation, we conclude that upon completion of the proposed automatic sprinkler system modifications, the protection provided by the partial raceway fire barriers in conjunction with the automatic sprinkler systems will achieve an acceptable level of protection equivalent to that required by Appendix R, Section III.G.2. Therefore, the licensee's deviation request is granted.(ref. 2.0.1)

2.13.5 Deviation Update

This Deviation is essentially bounded by the intervening combustible deviation (see 2.11). No further updates required.

2.14 Manual Operation for Control Room Air Handling Unit

2.14.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50 Appendix R, Section III.G which requires that one train of systems needed for hot standby must be maintained free from fire damage and operability of the hot standby systems must exist without making any repairs. Removal of fuses for isolation and use of jumpers are considered repairs.

2.14.2 Discussion

Remote control cable 1PL4512B for the main control room air handling unit (MCR AHU) B-B interacts with cables associated with MCR AHU A-A on elevation 714 of the Auxiliary Building. The MCR AHU B-B cable 1PL4512B will be disabled in the event of a fire by lifting wires B21DT1, B21DTP, B21DG1, and B21DW in compartment 1D of the 480V shutdown board 1B2-B, installing a jumper between terminal blocks 26 and 27 on the compressor and by replacing necessary control fuses. The HVAC system (Train B) will then be operated using the local controls at the compressor. A causality procedure will be provided to address the wire lifts, jumper, and control fuse replacement.

The above wire lifts, jumper, and control fuse replacement will be necessary to achieve main control room (MCR) ventilation. Cable 1PL4512B is for remote control only. The wire lifts and jumper will only be required in the event the fire damage prevents the compressor from starting. Once the wire lift and jumper are accomplished, the compressor can be operated using existing manual controls located at the compressor.

Plant operating experience indicates that MCR temperatures will not exceed 104F within a five-hour time duration and no safety-related equipment should be damaged. The time required to complete the wire lifts, jumper, and control fuse replacement is approximately one hour. Adequate manpower is available to perform the required actions. The location where the postulated fire may cause loss of both MCR AHU A-A and B-B (Auxiliary Building elevation 714) is separated from the MCR AHU A-A and B-B compressor and associated local controls, which are located in the Control Building, by three-hour fire-rated construction. The 480V shutdown board room 1B2-B where the wire lifts will be performed is separated from the postulated fire location by 1 1/2 hour fire-rated construction. In addition, automatic sprinklers, detection, standpipes, and portable extinguishers are provided for the above three locations.

2.14.3 Evaluation

The technical requirements of Appendix R, Section III.G are not met, in that in order to maintain ventilation of the control room, repairs may be required for the control room ventilation system in the event of fire within the Auxiliary Building. These repairs consist of the use of wire lifts, jumper and control fuse replacement and require approximately one hour to accomplish. The licensee's analysis indicates that the control room temperature will not exceed 104F within five hours after the loss of the control room ventilation system. This is sufficient time to permit necessary repairs to be accomplished prior to the need for control room ventilation. Furthermore, the fire protection features provided for the Auxiliary Building should reduce any major fire damage.

2.14.4 NRC Conclusion

Based on our evaluation, we conclude that the repairs required to restore ventilation to the control room in the event of a fire within the Auxiliary Building can be accomplished within a reasonable period of time prior to damage to any safety-related equipment. Also, the fire protection features provided for the Auxiliary Building should eliminate any major fire damage to the cabling an components of the control room ventilation system. These features provide an acceptable level of protection equivalent to that required by Appendix R, Section III.G.2 and the licensee's deviation request is granted.(ref. 2.0.1)

2.14.5 Deviation Update

Remote control cables for the MCR AHU B-B interacts with cables associated with MCR AHU A-A on elevation 714 and 734 of the Auxiliary Building. The same wire lifts, jumper, fuse replacement, and causality procedure that applies to elevation 714 applies to elevation 734. Basis: FHA Appendix R Compliance Strategy.

2.15 Inadequate Separation of ERCW Power Cables

2.15.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50 Appendix R, Section III.G.2.c which requires that one redundant train of components necessary for safe shutdown be enclosed by a one-hour rated fire barrier and that fire detectors and an automatic fire suppression system be installed in the fire area.

2.15.2 Discussion

On elevation 690 of the Auxiliary Building, power cables for both redundant divisions of the essential Raw Cooling Water (ERCW) pumps and the ERCW pumping station transformers from the yard pump house are routed into a metal enclosure (pull box) mounted on the concrete wall approximately ten feet above the floor. Each voltage level and train is separated from each other within the pull box by metal partitions. Circuit protective devices will ensure that a fault on any of these circuits will be cleared before the insulation on the cables reach their auto-ignition temperature.

The pull box has been provided with a 1 1/2 hour fire-rated coating of Pyrocrete on the outside of the box. Cables for one redundant train penetrate the box and run on elevation 690 while cables for the opposite redundant train are enclosed in a 1 1/2 hour fire-rated barrier from the pull box to the elevation 690 ceiling. Elevation 690 of the Auxiliary Building is provided with a pre-action sprinkler system actuated by cross-zoned ionization smoke detectors. Additional sprinklers are provided in the area around the pull box.

TVA's justification for this deviation is based on the position that appropriate fire protection has been provided for these circuits. Also, the fire protection for these circuits was reviewed by the NRC and determined to be appropriate and acceptable in the SER dated February 1980.

2.15.3 Evaluation

The ERCW power cables do not meet the separation requirements of Appendix R, Section III.G.2.c in that the cables for one train which are in the same fire area as the redundant train are not enclosed within a one-hour fire-rated barrier and area fire detection and fixed fire suppression systems are not provided. These cables are located with a raceway pull box and are separated by metal partitions which have less than one-hour fire rating. A fire detector or suppression system is not provided within the box. However, the box has been coated with Pyrocrete to provide a 1 1/2 hour fire-rated barrier. Therefore, an exposure fire outside the pull box should not damage the cables within the box prior to extinguishment by the area sprinkler system or by the plant brigade due to the coating on the box. The circuit protective devices for the cables within the box provide assurance that the circuit will be cleared prior to the cables reaching their auto-ignition temperature. The protection provided should assure that one shutdown train will remain free of fire damage.

2.15.4 NRC Conclusion

Based on our evaluation, we conclude that the fire protection features provided for the ERCW power cables will achieve an acceptable level of protection equivalent to that required by Appendix R, Section III.G.2.C; therefore, the licensee's deviation request is granted.(ref. 2.0.1)

2.15.5 Deviation Update None

2.16 Fire Rating of Equipment Hatch

2.16.1 Deviation Request

TVA requested a deviation from the requirements of 10CFR50 Appendix R, Section III.G.2.c which requires that redundant components required for safe shutdown be separated from each other by a fire barrier having a rating of one-hour and that fire detectors and automatic suppression systems be installed in the area.

2.16.2 Discussion

The covered hatch that separates 480V reactor MOV board room 2A (elevation 749) from 6900-V shutdown board room B (elevation 734) has been coated with Pyrocrete to provide a three-hour fire barrier between these two rooms. However, this design configuration has not been subjected to a hose stream test. The installation is similar to the configuration tested by Industrial Testing Laboratories, Inc., and approved for a three-hour fire rating. This installation makes the hatch an integral part of the elevation 734 ceiling. ASTM E119-83 does not require hose stream tests on columns, floor or ceiling assemblies. The NRC Information Notice 84-09 states that fire barriers installed to meet the requirements of Appendix R, Section III.G.2 must have a fire rating based on testing conducted by a nationally recognized testing laboratory for the configuration used in the plant.

Both the 480V reactor MOV BOARD ROOM 2A and the train B 690V shutdown board room are provided with pre-action sprinkler systems actuated by cross-zoned ionization smoke detectors.

TVA's justification for this deviation is based on the position that the protection and separation is adequate for these two rooms and that a hose stream test is not required for the covered hatch that has been upgraded to a three-hour fire barrier.

2.16.3 Evaluation

The separation between the 480V reactor MOV board room 2A and the 6900V shutdown board room B does not meet the technical requirements of Appendix R, Section III.G.2.c in that the fire rated coating installed on the equipment hatch cover between these two rooms is based on a design that has not been subjected to a hose stream test. However, this coating is rated at three-hours in lieu of the required one-hour and both of these rooms are provided with automatic sprinkler protection. These features should assure that at least one train will remain free of fire damage in the event of fire.

2.16.4 NRC Conclusion

Based on our evaluation, we conclude that the fire protection features provided for the separation between the 480V reactor motor operated valve board room 2A and 6900V shutdown board room B will achieve an acceptable level of protection that is equivalent to that required by Appendix R, Section III.G.2.c and the licensee's deviation request is granted.(ref. 2.0.1)

2.16.5 Deviation Update None.

2.17 One-Inch Mineral Wool Barriers in Lieu of One-Hour Fire Rated Barriers

2.17.1 Deviation Request

A deviation was requested from Section III.G.2.c to the extent that it requires a one-hour fire rated barrier between redundant safe shutdown cables.

2.17.2 Discussion

Safe shutdown circuits located within 20 feet of their redundant counterparts are routed through conduits wrapped in a 1-inch-thick Kaowool enclosure. The fuel load in the area consists of the charcoal filters in the auxiliary gas treatment system. This unit, which contains charcoal filters, has been provided with an internal fixed water spray system and the room area is covered by a preaction sprinkler system. The overall fuel load in the area is negligible.

The safe shutdown components in this area consist of the aforementioned cables.

Existing fire protection consists of fire extinguishers, manual hose stations, an area-wide fire detection system, and partial automatic fire suppression system coverage.

2.17.3 Evaluation

The technical requirements of Section III.G.2 are not met because TVA has installed fire rated enclosures around the conduits that meet the acceptance criteria of ASTM E-119 for 40 minutes instead of 1 hour.

In the 1978 Babcock and Wilcox report, "Tests for Fire Protection for Complete Fire Engulfment of Cable Trays and Conduits Containing Grouped Electrical Conductors," a 1-inch-thick Kaowool blanket wrap on solid bottom cable trays provided 40 minutes' protection for the cable tray when heated in a natural gas-fired furnace according to the heating rate specified in ASTM E-119.

The Sequoyah installation is deemed to provide better protection than the 40-minute endurance rating of the Babcock & Wilcox test for the following reasons:

a. Conduits are used in lieu of solid bottom cable trays;
b. The limited exposure to the conduit from the equipment located in the area is not equal to the direct flame impingement on the cable trays during the test; and
c. The light fuel load in the conduit-traveled area is not likely to produce the 2.5 million Btu per hour of the test furnace.

The principal concern was that if a fire should occur in any location where this barrier is installed, the elevated temperature produced could damage the Kaowool barrier and the protected shutdown cables within it, prior to the fire being extinguished. However, this area is protected by a fire detection system which annunciates in the control room. It is expected that the detectors would activate while the fire is in its formative stages, prior to significant heat and smoke generation.

The fire brigade would then be summoned and would extinguish the fire using portable fire extinguishers or manual hose stations.

Pending arrival of the fire brigade, the smoke and hot gases from the fire would be dissipated up into the ceiling area and outward into adjoining locations. If a significant temperature rise occurs, the sprinkler system would actuate to control the fire and cool the surrounding air temperatures. Therefore, the Kaowool barrier and the shutdown-related cables would not be subjected to the elevated temperatures which would cause them to fail.

Before the sprinkler system is activated, the inherent fire resistance of the Kaowool barrier provides reasonable assurance that at least one shutdown division would remain free of fire damage pending eventual fire extinguishment.

2.17.4 NRC Conclusion

Based on the evaluation, it is concluded that the existing level of fire protection provides an equivalent level of fire protection to that achieved by compliance with the technical requirements of Section III.G.2.c. Therefore the licensee's deviation is acceptable.(ref. 2.0.1)

2.17.5 Deviation Update

The Kaowool wrapped conduits run from the q line wall to the secondary containment shield wall. The ABGTS charcoal filters are a significant fire load and have been provided an internal water spray system. Basis: The original deviation request of October 1, 1981, the 45E890 series drawings, and FHA Appendix R Compliance Strategy. Modifications made as a result of design changes DCN M12745A and DCN M12746A result in the replacement of 1-inch Kaowool fire barriers (that are the subject of this deviation) with 1-hour rated Thermo-Lag 330-1 ERFBS, for those conduits evaluated to be essential for fire safe shutdown. This deviation request remains in the Fire Protection Report for historical purposes.

2.18 Manual Sprinkler System and One-Hour Fire Barrier System Installed in the 125V Vital Battery Board Rooms I-IV

2.18.1 Deviation Request

TVA requested a permanent deviation to the requirements of Section III.G.2 for the 125-volt vital battery board rooms I-IV in that a manual suppression system is installed in lieu of an automatic suppression system.

2.18.2 Discussion

The 125-volt vital battery board rooms I-IV are located on elevation 734 in the Auxiliary Building. The vital battery board rooms are separated from adjacent rooms in the Auxiliary Building by concrete construction that is equivalent to a 1.5 hour-rated-barrier. The Auxiliary Building is a designated fire area and is separated from adjacent fire areas by reinforced concrete walls which are considered equivalent to a 3-hour barrier. These barriers were found to be acceptable to the NRC staff in Supplement 4 to NUREG-0044.

The interactions in the 125-volt vital battery board rooms are as follows:

1. Cable B164I is routed through vital battery board room II and provides a power supply from the fifth vital battery to battery IV. With the fifth vital battery in service, a fire in either of these two rooms could cause loss of two redundant channels of dc vital power systems.

2. Cables 1B25II and 1B30II were installed in battery room I and cables 2B11III and 2B16III were installed in battery board room IV. These cables are the normal dc power supply cables to the 480-volt shutdown boards IB1-B, IB2-B, 2A1-A and 2A2-A. A fire in either of these rooms could cause loss of a dc power control bus of the boards, plus loss of the applicable channel of vital dc supply.

Two ionization smoke detectors are contained within each of the four 125-volt vital battery board rooms. The detectors are designed and installed as class A detection systems (NFPA 72 D, style D). A class A circuit configuration insures that the detectors will remain operable given a single open circuit or ground fault. Failure of the wiring will result in a trouble signal except for a wire to wire fault, which will cause an alarm signal to be sent to the main control room. The licensee's Fire Interaction Manual, SQN SOI 26.2, requires that the manual sprinkler control valves, located just outside the battery board rooms, be placed in the open position within 30 minutes following smoke detector annunciation and confirmation of a fire. The licensee expects its response time to be less than 15 minutes.

The licensee's revised FHA for the vital battery board rooms assumed that all existing trays were full of cable and used conservative estimates of cable in the control boards and distribution panels. From these analysis a maximum fuel loading of 136,416 Btu/sq-ft. was determined. This loading results in a standard fire severity of approximately 1.75 hours using Ingbergs fuel-load-fire-severity relationship (Drysdale, 1985, Reference3). The licensee's original FHA, which was based on the actual fuel loading in the rooms, determined a standard fire severity of about 15 minutes (20,000 Btu/sq-ft). The lower fire loading was used to justify the temporary deviation. The fire severity durations as a function of fuel load requires the fire to be fully developed in a post-flashover state. In the vital battery board rooms, with the fire doors closed, the fire will be ventilation controlled and unable to develop to its most severe potential based on fuel load alone. According to the licensee's calculations, the average atmosphere temperature in the room does not rise above 614°F with HVAC in operation and doors closed. The licensee also calculated compartment temperature for a post flashover situation with the door completely open. This produced a temperature curve similar to the ASTM E-119 curve but well within it for over the first hour. The staff reviewed these calculations and considers the assumptions and the methodology to be conservative in each case.

2.18.3 Evaluation

The fixed suppression system, class A wiring of the detection system, and the fire brigade provide assurance that a fire in the vital battery board rooms will be readily detected and suppression activities started within 30 minutes of detection.

The licensee demonstrated by calculations that the average compartment temperature would not exceed the ASTM E-119 curve values within the first hour of the fire even with the maximum fuel load considered possible for the room with the existing cable trays. The staff consider these calculations adequate to justify the 1.5 hour ratings of the walls, doors and fire dampers. These calculations also justify fire wrapping having a protection of 1 hour or greater within the room without immediate fire suppression. The licensee's calculations also indicate that transient combustibles may not present as much hazard as originally presumed and that the licensee's administrative controls on transient combustibles may be considered adequate without the compensatory fire watches on the 125-volt battery board rooms I-IV as were required with the temporary deviation.

The licensee did not address the likelihood and effects of direct flame impingement or direct thermal radiation on the wrapped conduit or the sprinkler pipe and hangers. While this is not considered a problem now, this could become significant if fuel loads increase or additional cable trays are added to the rooms.

The licensee is upgrading the existing suppression system in the fifth battery board room to an automatic system. This will be done before the restart from the Unit 1 Cycle 4 refueling outage. This meets the requirements of Section III.G.2 of Appendix R and no deviation is needed for this room once the modification is completed.

2.18.4 NRC Conclusion

The staff concludes that the deviation request in regard to Section III.G.2 in the 125-volt vital battery board rooms should be granted as a permanent deviations for the four vital battery rooms I-IV. The compensatory fire watches on these four rooms may be discontinued.(ref. 2.0.2, 2.0.4)

The granting of this deviation request, however should not preclude the documented evaluation of all future modifications to the vital battery board rooms for potential impacts on Appendix R compliance. Such evaluations should include any new installations of multiple cables in the existing cable trays or the additions of new trays. In particular, the effects of direct thermal radiation or flame impingement should be looked at in regard to the wrapped conduit and the sprinkler piping and brackets.

The deviation, approved by the staff in its letter dated November 4, 1988, for the fifth battery board room remains in effect with the compensatory measures discussed in the staff's letter. It will remain in effect until the restart of Unit 1 from the Cycle 4 refueling outage.

Based on the above, the staff also concludes that Sequoyah remains in compliance with General Design Criterion 3, Fire Protection, of Appendix A to 10 CFR Part 50.(ref. 2.0.2)

2.18.5 Deviation Update

NUREG-0011 and its supplements are the operating license Safety Evaluation Reports for Sequoyah.

The Fire Interaction Manual, SQN SOI 26.2, has been renumbered to 0-GO-8.

The Fire Severity Index of Low or below is utilized for these Vital Battery Board Rooms I - IV. This fire severity limit applies to rooms 734-A03, A04, A22, A23 within the Auxiliary Building. Basis: Part II Definitions.

Administrative controls on transient combustibles ensure the Fire Severity Index does not exceed Low without addressing the likelihood and effects of direct flame impingement or direct thermal radiation on the wrapped conduit or the sprinkler pipe and hangers.

Additionally, the design change process documents an evaluation of Appendix R compliance when necessary. Such evaluations will include any new installations of multiple cables in the existing cable trays or the additions of new trays. In particular, the effects of direct thermal radiation or flame impingement will be looked at in regard to the wrapped conduit and the sprinkler piping and brackets.

2.19 Process Monitoring Functions for (1) Condensate Storage Tank Level, (2) Refueling Water Storage Tank Level and (3) Wide Range Steam Generator Indication Not Provided within Auxiliary Control Room

2.19.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50 Appendix R, Section III.L.2.d which requires the process monitoring function for alternative or dedicated shutdown to be capable of providing direct readings of the process variables necessary to perform and control a plant shutdown. NRC IE Information Notice No. 84-09 identified the instrumentation necessary for alternative or dedicated shutdown.

2.19.2 Discussion

The following process monitoring instrumentation has not been provided in the auxiliary control room (ACR); (1) Condensate Storage Tank Level (CST) Indication, (2) Refueling Water Storage Tank Level (RWST) Indication, (3) Wide range Steam Generator Level Indication.

TVA provides the following justification for the lack of this instrumentation:

a. The CST level indication is not considered essential in the ACR due to automatic switchover capability to the essential raw cooling water (ERCW) header. During shutdown procedures, automatic switchover of the auxiliary feedwater pump suction from the CST to the ERCW header will be available when control is established in the ACR.

   Plant procedures instructs personnel operating the turbine driven AFW pump to insure automatic switchover takes place when suction pressure decreases below a specified level (indicating low level in the CST) or manually switch suction for all AFW pumps to ERCW, if automatic switchover fails to occur.

b. The RWST level indication is not considered essential in the ACR due to the large inventory and small demand requirements. The RWST contains over ten times the inventory required for cold shutdown. This is primarily used as makeup for contraction due to cooldown over a period of hours. Additionally, RWST level can be locally determined at the tank, as necessary.

c. Narrow range steam generator level and AFW flow indication to each generator is provided in the ACR. This instrumentation provides input to the automatic controls utilized to maintain steam generator (SG) level during plant shutdown during a fire. Although wide range instrumentation is available in the main control room (MCR), no automatic control or safety system inputs are derived from this instrumentation. Using AFW flow indication, the operator is able to confirm adequate reactor coolant system (RCS) post trip steam generator inventory control should the level fall below the narrow range indication. TVA's analysis indicates that narrow range level indication along with AFW flow indication, which provides primary indication of heat removal capability, is sufficient for use in safe shutdown procedures whenever the ACR is utilized. Additionally, the new emergency operating procedures developed by the Westinghouse Owner's Group do not require wide range SG level indication. The post-accident monitoring requirements of Regulatory Guide 1.97 utilize narrow range level indication and AFW flow for the determination of an adequate heat sink.

2.19.3 Evaluation

The Instrumentation provided on the remote auxiliary shutdown panel does not meet the requirements of 10CFR50 Appendix R, Section III.L.2.d since instrumentation is not provided for condensate storage tank level, refueling water storage tank level and wide range steam generator indication.

TVA has developed plant procedures which requires the operators to verify that the feedwater pumps automatically align to the essential raw cooling water header upon pump operation from the auxiliary control room or to manually align the pumps if the automatic alignment fails to occur and the pump suction pressure decreases below a specified level. The RWST level is available locally at the tank. Therefore, the tank level can be determined if needed. Wide range steam generator level indication is not required by the Westinghouse Owner's Group and is not provided on the auxiliary control panel. Regulatory Guide 1.97 utilizes narrow range level indication and auxiliary feedwater flow for determination of an adequate heat sink. This instrumentation is provided in the auxiliary control room and is considered sufficient by TVA's analysis for use in safe shutdown procedures.

2.19.4 NRC Conclusion

Based on our evaluation, we conclude that the available process monitoring instrumentation will achieve an acceptable level of protection equivalent to that required by Appendix R, Section III.L.2.d and the licensee's deviation request is approved.(ref. 2.0.1)

2.19.5 Deviation Update

RWST level can be locally determined at the tank or inferred via suction pressure to pumps aligned to the RWST, as necessary.

2.20 Auxiliary Control Room - T-Cold Instrumentation

2.20.1 Deviation Request

TVA requested a deviation from Section III.L.2.d of Appendix R requiring the installation of reactor coolant system cold leg temperature (T-cold) instrumentation in the Auxiliary Control Room (ACR). The staff's evaluation of the licensee's request is addressed below.

2.20.2 Evaluation

Section III.L.2.d of Appendix R states that the process monitoring function shall be capable of providing direct readings of the process variables necessary to perform and control the functions to (a) achieve and maintain subcritical reactivity conditions in the reactor; (b) maintain reactor coolant inventory; (c) achieve and maintain hot standby conditions; (d) achieve cold shutdown within 72 hours; and (e) maintain cold shutdown conditions thereafter. During the post-fire shutdown, the reactor coolant system process variables shall be maintained within those predicted for a loss of normal AC power, and the fission product boundary integrity shall not be affected; i.e., there shall be no fuel clad damage, rupture of any primary coolant boundary, or rupture of the containment boundary. Reactor coolant system cold leg temperature (T-cold) indication is one of the process variables typically provided to aid in assessing the establishment of natural circulation cooling.

By letter dated May 2, 1986, the licensee provided their justification for not installing T-cold instrumentation in the ACR. The process monitoring capability already provided at the ACR includes pressurizer pressure and level indication, steam generator pressure indication for all four steam generators, T-hot indication for all four RCS loops, ability to feed all four steam generators, level indication for all tanks and diagnostic instrumentation for shutdown systems. In addition, the licensee proposes to use T-sat (saturation temperature corresponding to steam generator pressure) instead of T-cold instrumentation in the ACR. The licensee has stated that indications of reactor coolant system (RCS) subcooling, T-hot stable or

decreasing, and steam generator pressure stable or decreasing are available in the ACR to indicate loss of natural circulation cooling. Furthermore, all of the above indications are specified for use in the SQN emergency procedures to verify adequate natural circulation, and the operators are periodically trained to shutdown the plant from the ACR.

Based on data obtained during startup testing at SQN and Diablo Canyon, the licensee provided the results of an evaluation of the relationship between T-sat and T-cold (Tc-Tsat), as follows:

	Sequoyah	Diablo Canyon
Mean	4.33°F	4.67°F
Standard Deviation	3.29°F	1.65°F

The temperature differences noted above are well within the tolerance and accuracy levels of the instrumentation. In obtaining the data, the SQN cooldown was terminated at approximately 46°F, whereas the Diablo Canyon cooldown was continued to below RHR initiation. Since the data (T-cold and steam generator pressure) were obtained simultaneously during the cooldown tests, the data demonstrate the adequacy of using steam generator pressure to determine T-sat and infer T-cold, as well as the lack of significant time lag between the two indications.

The licensee has stated that the natural circulation test at SQN was performed from the main control room and the equipment (not controls) used during the natural circulation test is identical to the equipment which would be used in an Appendix R shutdown from the ACR. For example, the auxiliary feedwater pumps, the centrifugal charging pumps, ERCW pumps and CCS pumps are used for natural circulation cooldown from the ACR and were also used during the main control room (MCR) test. Therefore, the test results are applicable to a shutdown from the ACR. Also, the instrumentation provided for verification of natural circulation is consistent with the Westinghouse Owners Group emergency response guidelines.

TVA has also evaluated the cost and radiological impact of installing T-cold instrumentation. The estimated cost for both units at Sequoyah is approximately $3.9 million, and would result in a radiation exposure of about 537 man-rem. Most of the work must be done in congested areas, and, for thermowell and thermocouple installation, in areas of high radiation. The above cost estimate does not include the cost of a post-modification hydrostatic test of the RCS and the cost of lost power generation if the installation of T-cold is a critical path activity for a refueling outage.

2.20.3 NRC Conclusion

The staff has evaluated the licensee's justification for using steam generator pressure to obtain T-sat and infer T-cold in lieu of directly measuring T-cold, in the ACR. The staff finds, based on the natural circulation tests at Sequoyah and Diablo Canyon, that T-sat and T-cold trend together reasonably well; furthermore, the operators have been trained in the use of steam generator pressure. Also, the licensee has the ability to monitor RCS subcooling and to feed and monitor all four steam generators from the ACR. Therefore, based on the staff's consideration of the technical merits of the licensee's proposal, and the cost and radiological impact of providing T-cold monitoring capability in the ACR, the staff concludes that the use of T-sat in assessing natural circulation cooling in the RCS is acceptable at the Sequoyah Nuclear Plant.(ref. 2.0.3)

2.20.5 Deviation Update

None.

2.21 Non-Seismic Drain Piping from Each Reactor Coolant Pump Oil Collection System

2.21.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50, Appendix R, Section III.0 which requires the oil collection system including the drain piping system to be designed, engineered, and installed such that failure will not lead to fire during normal or design basis accident conditions and there is reasonable assurance that the system will withstand the Safe Shutdown Earthquake (SSE).

2.21.2 Discussion

The lubricating oil system for the reactor coolant pump motors and the collection system drainage tanks (auxiliary containment sumps) are all designed not to fail during a SSE and to remain functional following a seismic event. However, the drain piping between the oil collection basins from around the pumps to the drain collection tanks is designed to not fail and damage nuclear safety-related equipment during a SSE but is not designed to maintain its pressure boundary integrity following a SSE.

TVA's justification analysis indicates that random oil leaks are not assumed to occur simultaneously with a seismic event and justifies the deviation on the basis that the design of the lubricating system provides more than reasonable assurance that the system will not fail and cause a fire as a result of a seismic event.

2.21.3 Evaluation

The technical requirements of Appendix R, Section III.0 are not met in that the drain piping between the collection basin from around the pumps to the drainage tanks is not designed to maintain its pressure boundary integrity following a SSE. However, the motors for the reactor coolant pumps and the lubricating oil systems are designed with the capability for withstanding a SSE. Therefore, major oil leaks should not occur during a seismic event and random oil leaks during normal plant operations should be safely collected by the collection system.

2.21.4 NRC Conclusion

Based on our evaluation, we conclude that the oil collection system for the reactor coolant pumps will achieve an acceptable level of protection equivalent to that required by Appendix R, Section III.0; therefore, the licensee's deviation is granted.(ref. 2.0.1)

2.21.5 Deviation Update None.

2.22 Inadequate Size Drain Tank for Oil Collection System

2.22.1 Deviation Request

TVA requested a deviation from the technical provisions of 10CFR50 Appendix R, Section III.0 which requires the drainage collection tank for the reactor coolant pump oil collection system to hold the entire contents from all of the reactor coolant pump lubricating oil systems within each reactor building.

2.22.2 Discussion

The lubricating oil system for the reactor coolant pump motors and the oil collection system drainage tanks (auxiliary reactor building sump) are all designed not to fail during a SSE and to remain functional following a seismic event. Therefore, since the lubricating oil system for the reactor coolant pump motors should not be damaged during a seismic event, the drainage tank for the oil collection system should only need to be required to hold the oil resulting from the largest spill from a single failure or random leak in lieu of the largest spill rupture from all of the reactor coolant pump motors within each containment.

TVA's justification analysis indicates that the largest postulated single lubricating system failure for one reactor coolant pump would be retained by the collection system and then drained into the auxiliary reactor building sump and embedded piping between the collection system and the drainage sump. The licensee justifies the deviation based on the seismic design of the reactor coolant pump motors and lubrication system which should limit the maximum oil spill to the quantity of oil from a lubricating system rupture or failure from only a single pump motor upper oil reservoir. The drainage system and collection sump are of sufficient size to accommodate this spill.

2.22.3 Evaluation

The technical requirements of Appendix R, Section III.0 are not met in that the capacity of the oil collection system drainage tank is insufficient to hold the entire lube oil capacity from potential pressurized and unpressurized leakage from all four reactor coolant pump lube oil systems within each reactor building.

The largest single lubricating system failure should involve 240 gallons of oil from the upper bearing oil system for one reactor coolant pump. This oil would be caught by the oil collection system and drained onto the auxiliary reactor building sump which has a capacity of approximately 200 gallons. Additional storage capacity of 140 gallons would be available on the embedded piping systems between the collection systems and the sump. The total capacity of the sump and piping systems is approximately 340 gallons. This greater than the largest postulated oil spill.

Procedures have been issued which require the operator to pump the sump in the event of a reactor coolant pump high/low reservoir alarm to assure adequate capacity is available within the sump for oil collection. In the unlikely event that the sump is full of water, the licensee's analysis indicates that no more than 100 gallons of oil would backup through floor drains.

2.22.4 NRC Conclusion

Based on our evaluation, we concluded that the size of the oil collection system drainage tank should be of sufficient size to accommodate the largest potential oil leak from one reactor coolant pump. Since the pump motors and lubricating systems are designed to withstand a SSE, the failure of more than one lubricating system during a seismic event should not occur. Therefore, the oil collection systems provide an acceptable level of protection equivalent to that required by Appendix R, Section III.0 and the licensee's deviation request is granted.(ref. 2.0.1)

2.22.5 Deviation Update

The annunicator response procedures contains the necessary guidance to pump the pocket sump on a RCP high/low oil reservoir alarm.

TABLE 2.0-1

Process Control Requirements for Validating Appendix R Deviation Bases

1. Maintain the Fire Severity Index at "Low" or below for locations within the Control Bldg (see Table 2.1-1), except the MCR, that do not have automatic fire suppression. Basis Part VII Deviation 2.1
2. Maintain the Fire Severity Index at "Moderate" or below in room 690-A01 within the Auxiliary Building.
3. Avoid in-situ combustibles in the immediate area of the PASF duct penetrations in rooms 706-A06, 706-A08 and 706-A09 within the Auxiliary Building.
4. Maintain the Fire Severity Index at "Low" or below in rooms 706-A06, 706-A08 and 706-A09 within the Auxiliary Building.
5. Maintain the Fire Severity Index at "Moderate" or below in room 714-A01 within the Auxiliary Building.
6. Maintain the Fire Severity Index at "Low" or below in room 734-A13 within the Auxiliary Building.
7. No appreciable amounts of in-situ combustibles shall be located in the RWST/ERCW pipe tunnel/chase.
8. Maintain the Fire Severity Index at "Low" or below in FAA-030 (collectively rooms 690-A02, 690-A03, 690-A04, and 690-A05) within the Auxiliary Building.
9. The type and quantity of transient combustibles allowed through the 480V shutdown board room 1B2-B and the 480V shutdown board room 2A2-A are minimized by plant procedures.
10. Maintain the Fire Severity Index at "Moderately Severe" or below in rooms 734-A05 and 734-A21 within the Auxiliary Building.
11. The Auxiliary Building rooms without the required detection and/or suppression systems (see Table 2.12-1) or portions of rooms without the required detection and/or suppression systems (see Table 2.12-2) shall not contain components or cabling for both redundant shutdown trains.
12. Maintain the Fire Severity Index at "Low" or below for the rooms listed in Table 2.12-1 since these rooms do not have the required detection and/or suppression systems.
13. No appreciable amounts of in-situ combustibles shall be located in the rooms identified as such in Table 2.12-1 since they are not fire rated compartments.
14. Maintain the fire severity limit as listed in Table 2.12-2 or below since portions of these rooms do not have the required detection and/or suppression systems and are part of larger rooms with appreciable in-situ fire loading.
15. The Auxiliary Building rooms without rated walls and without the required detection and/or suppression systems shall contain no appreciable amounts of in-situ combustibles.
16. The design change process documents an evaluation of Appendix R compliance when necessary. Such evaluations will include any new installations of multiple cables in the existing cable trays or the additions of new trays. In particular, the effects of direct thermal radiation or flame impingement will be looked at in regard to the wrapped conduit and the sprinkler piping and brackets. This applies to rooms 734-A03, A04, A22, A23 within the Auxiliary Building.
17. Procedures shall require appropriate operator actions in the event of a reactor coolant pump high/low reservoir alarm to assure adequate capacity is available within the sump for oil collection.

TABLE 2.1-1

Control Building Rooms Containing Redundant Safe Shutdown Equipment, without Fire Detection and/or Automatic Suppression

Room Number(s)	Room Name(s)
669.0-C4 & -C5	250v Battery Board Room 1 & 2
669.0-C8	24v & 48v Battery Bd and Charger Room
669.0-C11	Corridor (Note: This room has detection and manual suppression. The detectors alarm in the control room, but do not initiate the suppression system.)
669.0-C12	Secondary Alarm Station
C1 & C2	Control Bldg Stairs C1 & C2
685.0-C2	Corridor
706.0-COR	Corridor
732.0-C12	Main Control Room
732.0-C13	Relay Room
732.0-C17 & -C18	NRC Office and Conference Room

TABLE 2.12-1

Auxiliary Building Rooms Containing Redundant Safe Shutdown Equipment, without Fire Detection and/or Automatic Suppression - Maximum Allowable Fire Severity: LOW

(Sumps, pits, and enclosed filter cubicles not specifically listed since they are void of appreciable combustibles.)

Room Number	Room Name	Allowance for Appreciable Amounts of In-situ Combustibles	Notes
651.0-A1	Waste Holdup Tank	No	
651.0-A2	Waste Evaporator Feed Pumps	No	
653.0-A1	Corridor	No	6
653.0-A2	Holdup Tank Room A	Yes	1, 5
653.0-A3	Holdup Tank Room B	Yes	1, 5
653.0-A4	Floor Drain Collection Pump and Filter Room	No	
653.0-A4a	Floor Drain Collection Tank Room	No	
653.0-A5	Gas Stripper Feed Pump	No	6
653.0-A6	Sump Pump Room	No	6
653.0-A7	Sump Tank Room	No	
653.0-A8	Containment Spray Pump 1B-B	Yes	2, 5
653.0-A9	Containment Spray Pump 1A-A	Yes	2, 5
653.0-A10	RHR Pump Room 1B-B	Yes	2, 5
653.0-A11	RHR Pump Room 1A-A	Yes	2, 5
653.0-A12	RHR Pump Room 2A-A	Yes	2, 5
653.0-A13	RHR Pump Room 2B-B	Yes	2, 5
653.0-A14	Containment Spray Pump 2A-A	Yes	2, 5
653.0-A15	Containment Spray Pump 2B-B	Yes	2, 5
653.0-A16	Pipe Gallery	No	
653.0-A17	Pipe Gallery	No	
669.0-A2	Valve Gallery	No	
669.0-A3	Gas Decay Tank Room	Yes	1, 5
669.0-A5	Gas Decay Tank Room	Yes	1, 5
669.0-A8	Pipe Gallery and Chase	No	5
669.0-A9	Charging Pump 1A-A	Yes	4, 5
669.0-A10	Charging Pump 1B-B	Yes	4, 5
669.0-A11	Charging Pump 1C	Yes	4, 5
669.0-A16	Valve Gallery	No	
669.0-A17	Waste Evaporator Package	Yes	1, 4, 5
669.0-A18	Auxiliary Waste Evaporator Package	Yes	1, 4, 5
669.0-A21	Charging Pump 2C	Yes	4, 5
669.0-A22	Charging Pump 2B-B	Yes	4, 5
669.0-A23	Charging Pump 2A-A	Yes	4, 5
669.0-A24	Pipe Gallery and Chase	No	5
669.0-A27	Concentrate Filter	No	
669.0-A29	Boric Acid Evaporator Package Room B	No	
669.0-A30	Boric Acid Evaporator Package Room A	No	
669.0-A31	Spare Room	Yes	

TABLE 2.12-1

Auxiliary Building Rooms Containing Redundant Safe Shutdown Equipment, without Fire Detection and/or Automatic Suppression - Maximum Allowable Fire Severity: LOW

Room Number	Room Name	Allowance for Appreciable Amounts of In-situ Combustibles	Notes
690.0-A7	Volume Control Tank Room	Yes	4, 5
690.0-A8	Reactor Building Access Room	Yes	5
690.0-A9	Valve Gallery,Demin and Filter Enclosures	No	
690.0-A10	Seal WaterHx 1A	No	5
690.0-A11	Heat Exchanger 1B	Yes	5
690.0-A12	Heat Exchanger 1A	Yes	5
690.0-A15	Heat Exchanger 2A	Yes	5
690.0-A16	Heat Exchanger 2B	Yes	5
690.0-A17	Seal WaterHx 2A	No	5
690.0-A18	Valve GalleryDemin and Filter Enclosures	No	
690.0-A20	Volume Control Tank Room	No	4, 5
690.0-A21	Reactor Building Access Room	Yes	5
690.0-A22	Valve Gallery	No	
690.0-A23	CVCS Valve Gallery	No	
690.0-A23a	CVCS Valve Gallery	No	
690.0-A24	WGC Valve Gallery	No	
690.0-A25	Waste Gas Compressor B	Yes	1, 3, 5
690.0-A26	Waste Gas Compressor A	Yes	1, 3, 5
690.0-A28	Pipe Chase	No	5
690.0-A29	Pipe Chase	No	5
690.0-A30	Air Lock	No	5
690.0-A31	Waste Gas Analyzer	No	
706.0-A1	Main Steam Valve Room	Yes	1, 5
706.0-A2	Main Steam Valve Room	Yes	3
706.0-A10	Main Steam Valve Room	Yes	3
706.0-A11	Main Steam Valve Room	Yes	1, 5
706.0-A12	Main Steam Valve Instrument Room	Yes	1, 3
706.0-A13	Main Steam Valve Instrument Room	Yes	1, 3
706.0-PN1	PING Room Unit 1	Yes	3
706.0-PN2	PING Room Unit 2	Yes	3
714.0-A4	Air Lock	Yes	1, 5
714.0-A6	Air Lock	Yes	1, 5
714.0-A7	Let Down Heat Exchanger	Yes	5
714.0-A8	Let Down Heat Exchanger	Yes	5
714.0-A10	Air Lock	Yes	1, 5
714.0-A11	Air Lock	Yes	1, 5
714.0-A15	Fuel Detector Room	No	
714.0-A16	Fuel Detector Room	No	
734.0-A13	Refueling Room	Yes	1, 5
749.0-A03	125v Vital Battery Rm. I	Yes	6
749.0-A04	125v Vital Battery Rm. II	Yes	6

TABLE 2.12-1

Auxiliary Building Rooms Containing Redundant Safe Shutdown Equipment, without Fire Detection and/or Automatic Suppression - Maximum Allowable Fire Severity: LOW

Room Number	Room Name	Allowance for Appreciable Amounts of In-situ Combustibles	Notes
749.0-A13	125v Vital Battery Rm. III	Yes	6
749.0-A14	125v Vital Battery Rm. IV	Yes	6
753.0-A01	Elevator Machine Room	Yes	1
763.0-A1	Fan Room	Yes	1
763.0-A2	Roof Access Air Lock	Yes	1
763.0-A3	Mechanical Equipment Room 1B	Yes	6
763.0-A4	Mechanical Equipment Room 2B	Yes	6

Notes:

1. Combustibles allowed due to compartmentation provided jointly for this room and adjacent rooms by barriers rated for 1.5 hours.
2. Detection is provided in this room except the labyrinth.
3. Combustibles allowed due to compartmentation provided jointly for this room and adjacent rooms by barriers rated for 3 hours.
4. Detection and Suppression is provided in this room except the labyrinth.
5. Compartmentation for this room is adequate for the hazards present as approved by the SER 2/80. Additional combustibles allowed on a case-by-case basis.
6. Detection is provided in this room.

TABLE 2.12-2

Auxiliary Building Rooms Containing Redundant Safe Shutdown Equipment, with only Partial Fire Detection and/or Automatic Suppression

No appreciable combustibles are to be located in the portions of these rooms without detection/suppression.

Room Number	Large Room Name Small Portion Location	Notes	Maximum Fire Severity
669.0-A1	Corridor RWPP and Filters A5/v-w	1	Moderate
690.0-A1	Corridor Pipe Penetrations to TB A14-15/q-r		Moderate
734.0-A2	6.9kV SD Bd. Rm. A Corridor Only A1-A3/s	1	Moderately Severe
734.0-A24	6.9kV SD Bd. Rm. B Corridor Only A13-A15/s	1	Moderately Severe
734.0-A10	SGB Room Stairway No. 9	1	Moderate
734.0-A2	6.9kV SD Bd. Rm. A Stairway No. 8	1	Moderately Severe
734.0-A12	RB Access Room Spiral Stair No. 2	2	Moderate
749.0-A2	480v Board Rm. 1B Vital Inverter/Battery Charger II A6-A8/q-r	3	Severe
749.0-A15	480v Board Rm. 2B Vital Inverter/Battery Charger III A8-A10/q-r	3	Severe
734.0-A14	RB Access Room Spiral Stair No. 1	2	Moderate
734.0-A24	6.9kV SD Bd. Rm. B Stairway No. 7	1	Moderately Severe

1. Compartmentation for this room is adequate for the hazards present as approved by the SER 2/80.
2. This room is protected by an automatic suppression system except for the top of the spiral stairs
3. A detection system is provided for this area. See separate deviation also.

3.0 SQN 86-10 EVALUATIONS FOR 10CFR50 APPENDIX R

In accordance with Generic Letter (GL) 86-10, "Interpretations of Appendix R", Section C, "Documentation Required to Document Compliance", TVA engineers and consultants under contract to TVA have used the GL 86-10 type evaluation process to document the acceptability of existing plant configurations. This has been accomplished by Fire Protection EngineersFPEs) who are graduateFPEs, Engineers who are Member Grade in the Society of Fire Protection Engineers (SFPE), or equivalent non-member engineers who meet SFPE member requirements. These evaluations are typically in the form of Design Calculations or 10CFR50.59 Safety Assessment/Safety Evaluations (SA/SE) with required references. Listed below is a summary followed by excerpts from calculations and SA/SE's which have been approved to document and/or clarify an existing installed configuration using the GL 86-10 process. The calculations are permanently maintained in the SQN Records and Information Management System (RIMS) and the Calculation Cross Reference Information System (CCRIS). The calculation number or SA/SE reference is provided below.

3.1 Analysis of Cable Tray Through Penetration Firestop System, SQN-00-D052/FSG-WCB-110587, R1

3.2 Analysis for the Pressurizer and Steam Generator Instrument Sense Lines, SQN-00-D052/EPM-EAC-011888, R1

3.3 Analysis of 1/8-Inch Steel Plate Additions to Door C-14, SQN-00-D052/EPM-MHS-011888, R0

3.4 Analysis of Selected RCS Letdown Circuits in the Unit 2 Annulus, SQN-00-D052/EPM-MHS-030588, R1

3.5 Analysis of Selected RCS Letdown Circuits in the Unit 1 Annulus, SQN-00-D052/EPM-MHS-052588, R0

3.6 Analysis of the 125-V Battery Board Rooms, SQN-00-D052/EPM-MHS-111188, R0

3.7 Analysis of Unit 2 Neutron Source Range Cables on Elevation 690' in the Auxiliary Building, SQN-00-D053/EPM-MHS-053089, R1

3.8 Analysis of Unit 1 Neutron Source Range Cables in the Auxiliary Building, SQN-00-D052/EPM-EAC-070589, R0

3.9 Analysis of Neutron Source Range Monitoring Cables in the Unit 1 Annulus, SQN-00-D052/EPM-DAB-120189, R0

3.10 Penetration Fire Seals for 714.0 1-Hour Fire Wall, SQN-AR-D052/FSG-SLK-120485, R1

3.11 Analysis of a Fire Barrier on Elevation 714' in the Auxiliary Building, SQN-00-D053/EPM-MHS-020491, R0

3.12 Analysis for Unit 2 Appendix R Cables Above Valve Gallery Mezzanine, Elevation 690' Auxiliary Building, SQN-00-D052/EPM-ERS-081491, R0

3.13 Analysis of the Unit 1 Appendix R Cables Above Valve Gallery Mezzanine, Elevation 690', Auxiliary Building, SQN-00-D052/EPM-AMJ-081691, R0

3.14 Through-Penetration Firestop Seals in the Auxiliary Bldg. El. 714.0 Appendix R Firewall, SEQ-00-D053/FSG-WCB-081586, R1

3.15 Analysis of Shield Building Pipe Seal Restrictor Plate, SQN-26-D053/EPM-ERS-010493, R0

3.16 Analysis of Security Card Reader, SQN-26-D053/EPM-ERS-122293, R0

3.17 Analysis of Diesel Generator Building Fire Dampers, SQN-26-0053/EPM-VTI-101994, R0

3.18 Analysis of the Fire Protection CO_2 System Panel in the East Wall of Room 722.0-08, SQN-26-D054/EPM-VTI-111494, R0

3.19 Analysis of Control Building Fire Dampers, SQN-26-D053/EPM-VTI-113094, R0

3.20 Analysis of Auxiliary Building Fire Dampers, SQN-26-D053/EPM-VTI-120894, R0

3.21 Analysis of Fire Barrier Separating Rooms 706.0-C2 and 706.0-C4, SQN-26-D054/EPM-VTI-012895, R0

3.22 Analysis of Containment Access Hatches Located on the 734' Elevation of the Auxiliary Building, SQN-26-D054/EPM-VTI-012995, R0

3.23 Analysis of Penetration Located Between Rooms 669.0-A1 and 669.0-A31, SQN-26-D054/EPM-VTI-013095, R0

3.24 Fire Hazards Evaluation of Embedded and Inaccessible Penetrations, SQN-26-D054/EPM-VTI-013195, R0

3.25 Analysis of Remaining Auxiliary Building and Control Building Fire Dampers, SQN-26-D053/EPM-VTI-082895, R0

3.26 Analysis of Detection and Suppression Capability in the Control Building Corridor 669.0-C11, Safety Analysis and Safety Evaluation, Request for SAR Change - Section 9.5.1, R0

3.27 Analysis of Detection in the Control Building Corridor 685.0-C2, Safety Analysis And Safety Evaluation, SQ940549PER, R0

3.28 Analysis of Numerous Fire Barrier Changes/Clarifications for the FHA and Compartmentation Drawings and other Misc. Evaluations itemized below (Reference the GL 86-10 evaluation in the Safety Assessment/Evaluation of DCN S11785A)

3.28.1 The barrier designations for specific portions of exterior walls of the Auxiliary, Control, and Reactor Buildings are not required to be fire rated barriers (Ref DCN S11786A).

3.28.2 The Spreading room (706.0-C2) and the Instrument Shop (706.0-C3) are in the same Fire Area as the Mechanical Equipment Room (732.0-C1), Corridor (732.0-C3), Main Control Room (732.0-C12), and the Corridor (732.0-C15), thereby derating portions of the Control Building El 732.0 floor as an approved 3 hr barrier (Ref. DCN S11786A, SQ950356PER).

3.28.3 The structure between the Fuel Transfer Canal on the Auxiliary Building Refuel floor and the Reactor Building Keyway is an equivalent 3 hour fire barrier, including the Fuel Transfer Tube (Reference DCN S11786A, SQ960854PER).

3.28.4 There is an equipment hatch in the ceiling of the Control Building Mechanical Equipment Room (669.0-C01) which is common to the Turbine Building elevation 685.0 that is evaluated as an equivalent fire barrier (DCN S11786A).

3.28.5 Drop-out panels on elevation 653.0 to the passive sump are shown as barrier openings which are evaluated as acceptable (DCN S11786A).

3.28.6 The barriers between the 696.0 pipe tunnel (which is part of room 669.0-A15) to rooms 706.0-A3, -A4, & -A5 is indicated as a 3 hr fire barrier on 1,2-47W494-3. The barrier consists of a floor, an unqualified floor hatch (barrier opening), and a pipe tunnel that provide equivalent protection (DCN S11786A).

3.28.7 Railroad Bay motorized hatches and vertical door enclosures are designated as barrier openings in the Refueling Floor on 1,2-47W494-4 which are evaluated as acceptable (DCN S11786A).

3.28.8 The Auxiliary Building elevator enclosure (Columns A8 & T) is indicated as an equivalent 12 hr barrier on applicable 47W494 drawings (DCN S11786A).

3.28.9 An Appendix A response (BTP 9.5.1) to the NRC has stated that doors C29, C34, C36, and C54 are locked and alarmed in the Control Room and Security System Alarm Station. This is not the current configuration and an evaluation is provided to show that the intent of this response is still met (Reference DCN S11786A, SQ960783PER).

3.28.10 Diesel Generator Building Doors D1, D2, D3, and D4, along with their concrete missile barriers, are designated as equivalent 3 hr fire barriers (DCN S11786A).

3.28.11 Barrier openings for ventilation are identified in the west wall of ERCW Pumping Station room 720.0-2 and are evaluated as providing equivalent protection (DCN S11786A).

3.28.12 The Tunnel from the Turbine Building to the CCW Intake Pumping Station is evaluated as an equivalent 3 hr fire barrier (DCN S11786A).

3.28.13 A barrier opening (. 24" drain pipe) exists in the west wall of the Diesel Generator Building from the building sump enclosure to the yard (DCN S11786A).

3.28.14 Audit item SQN-17 of NA&L Audit SSA9604 identified sliding fire doors in the Diesel Generator Building (D7a & D8a) and the Control Building (C29a, C34a, C36a & C54a) that have only one fusible link instead of three as required by NFPA-80 (DCN S11786A).

3.28.15 Audit item SQN-10A of NA&L Audit SSA9604 identified a that wet pipe sprinkler system was installed above rate compensated thermal detectors and fire suppression sprinklers which appears to be in conflict with Section 3-4.1 of NFPA 72E (1974) (DCN S11786A).

3.28.16 Dampers in Non-FSSD barriers that have been identified with deficiencies are designated as acceptable barrier openings (DCN S11786A).

3.28.17 The RB Equipment Hatch blast doors are designated as equivalent 3 hr fire barriers (DCN S11786A).

3.29 Analysis of Cable Tray Through-Penetration Firestop System (DCN S10820B)

3.30 Evaluation of Various Penetration Seal Configurations Not Bounded by Available Test Data, SQN-DES1-015.

3.31 Fire Ratings of Hollow Core Masonry Walls, SCG1S591.

3.32 Fire Barrier Rating Evaluation for Inaccessible Barriers and Penetration Seals, MDQ0302-980019.

3.33 Fire Barrier Evaluation for ERCW Manhole/Handholes #12, 29, 33, MDQ0317-970007.

3.1 Analysis of Cable Tray Through Penetration Firestop System, SQN-00-D052/FSG-WCB-110587, R1

3.1.1 Statement of Problem

Cable tray fills at fire barriers exceed those of the tested fire seal configurations.

3.1.2 Purpose

To determine if the cable tray through-penetration firestop and pressure seal system installed in accordance with TVA drawings 45W880-262 R23, Detail A26, and 45N880-23, R13, Detail A23 is an acceptable fire barrier. Although TVA is confident of the adequacy of the initial installation, the cable loading at the penetrations has increased as a result of modification activities. The following discussion addresses the impact of additional cable loading on fire seal adequacy.

3.1.3 Evaluation

The definition of "percent (%) fill" is the amount of area occupied by cables in a specific tray, when viewed as a section, can be calculated by adding together the cross-sectional areas of each cable in the tray. The formula $A = B\hat{r}$ can be used for this purpose. A cable tray "% fill" will be a ratio of the area occupied by the cables divided by the cross-sectional area of the tray they are in. Since the cables are round and cannot be packed tightly enough together to eliminate all air spaces, a 35% to 40% fill is usually considered representative of a full tray (one where the cables are level with the top of the tray). Trays that have over a 35% to 40% fill will have cables installed above the tray top. This opinion has been established by relying on the Watts Bar test data and good engineering judgment.

3.1.4 Summary

It is the conclusion of this analysis that the existing design provides an adequate firestop system against the passage of hot gas or smoke, and prevents "flame through." It is therefore approved for continued use as an integrated pressure and equivalent 3-hour rated cable tray fire seal.

3.2 Analysis for the Pressurizer and Steam Generator Instrument Sense Lines, SQN-00-D052/EPM-EAC-011888, R1

3.2.1 Statement of Problem

The instrument sense lines necessary for monitoring level in the pressurizer and steam generators may be affected by a fire within containment.

3.2.2 Purpose

The instrumentation sense lines that provide the capability for monitoring pressurizer and steam generator level are necessary for achieving hot shutdown in a PWR. The pressurizer sense lines in containment at Sequoyah are not separated or protected in accordance with the requirements of 10CFR50 Appendix R, Section III.G.

To evaluate the effects of a fire within containment on the pressurizer and steam generator sense lines, a detailed fire hazards analysis has been performed in accordance with the guidelines set forth by the NRC in 10CFR50 Appendix R, Section II.B., NUREG 0800 CMEB 9.5-1, Section C.6, and Generic Letter 86-10, Section C.

3.2.3 Evaluation

3.2.3.1 Evaluation - For Unit 1

At least one level monitoring instrument for each of the steam generators will be operable for any postulated fire that occurs within the containment during operation. The instruments that will remain operable are the following:

Steam Generator No. 1 (1-LT-3-38)
Steam Generator No. 2 (1-LT-3-51)
Steam Generator No. 3 (1-LT-3-93)
Steam Generator No. 4 (1-LT-3-106)

At least one pressurizer level monitoring channel will be available for all postulated fires. The following channels are installed and subject to affects due to a fire.

1-LT-68-320
1-LT-68-335
1-LT-68-339

For a fire involving RCP No. 1, the pressurizer level monitoring capability of instruments 1-LT-68-320 and 1-LT-68-339 would not be affected.

For a fire involving RCP No. 2, the pressurizer level monitoring capability of 1-LT-68-339 would not be affected.

For a fire involving the CRDM cable trays, the level monitoring capability of instruments 1-LT-68-320 and 1-LT-68-339 would not be affected.

For a fire involving the pressurizer heater cables, the level monitoring capability of 1-LT-68-320, 1-LT-68-335, and 1-LT-68-339 would not be affected.

3.2.3.2 Evaluation - For Unit 2

At least one level monitoring instrument for each of the steam generators will be operable for any postulated fire that occurs within the containment during operation. The instruments that will remain operable are the following:

Steam Generator No. 1 (2-LT-3-38)
Steam Generator No. 2 (2-LT-3-51)
Steam Generator No. 3 (2-LT-3-93)
Steam Generator No. 4 (2-LT-3-106)

For a fire involving RCP No. 1, the pressurizer level monitoring capability of instruments 2-LT-68-335 and 2-LT-68-339 would not be affected.

For a fire involving RCP No. 2, the pressurizer level monitoring capability of 2-LT-68-339 would not be affected.

For a fire involving the CRDM cable trays, the level monitoring capability of instruments 2-LT-68-335 and 2-LT-68-339 would not be affected.

For a fire involving the pressurizer heater cables, the level monitoring capability of 2-LT-68-320, 2-LT-68-335, and 2-LT-68-339 would not be affected.

3.2.4 Summary

3.2.4.1 Summary - Unit 1

"Equipment Required for Safe Shutdown for 10CFR50 Appendix R" calculation SQN-SQS4-127 lists the minimum instrumentation that must remain operable to safely shutdown after a fire incident. For pressurizer level indication, at least one of the three instruments must remain operable. In all of the postulated fire scenarios within containment, 1-LT-68-339 is expected to remain operable thus satisfying the functional criteria. For each steam generator, the functional criteria requires that at least one of the level monitoring instruments remain operable during a fire incident. At least one instrument for each steam generator meets the separation or shielding requirements of 10CFR50 Appendix R. Therefore, the process monitoring capability will be maintained during a fire incident within the containment at Sequoyah.

3.2.4.2 Summary - Unit 2

"Equipment Required for Safe Shutdown for 10CFR50 Appendix R" calculation SQN-SQS4-127 lists the minimum instrumentation that must remain operable to safely shutdown after a fire incident. For pressurizer level indication, at least one of the three instruments must remain operable. In all of the postulated fire scenarios within containment, 2-LT-68-339 is expected to remain operable thus satisfying the functional criteria. For each steam generator, the functional criteria requires that at least one of the level monitoring instruments remain operable during a fire incident. At least one instrument for each steam generator meets the separation or shielding requirements of 10CFR50 Appendix R. Therefore, the process monitoring capability will be maintained during a fire incident within the containment at Sequoyah.

3.3 Analysis of 1/8-Inch Steel Plate Additions to Door C-14, SQN-00-D052/EPM-MHS-011888, R0

3.3.1 Statement of Problem

The addition of 1/8-inch steel plates welded to door C-14 changes the listed UL configuration.

3.3.2 Purpose

To evaluate the effects of the modification to door C-14 with respect to the fire endurance on the door assembly.

3.3.3 Evaluation

The modifications to door C-14 will not adversely affect the doors 3-hour fire endurance rating. The arrangement of doors C-14 and C-15 provide redundant 3-hour fire barriers. Based on a fire hazard analysis which evaluated location and concentration of combustibles, available fire suppression/detection, fire brigade response time, etc., a 3-hour fire was determined not to be credible in either area.

3.3.4 Summary

The addition of the 1/8-inch steel plates will not degrade the fire endurance capability of the door assembly or the fire barrier in which it is installed. The door will maintain the fire resistance rating of the barrier.

3.4 Analysis of Selected RCS Letdown Circuits in the Unit 2 Annulus, SQN-00-D052/EPM-MHS-030588, R1

3.4.1 Statement of Problem

The electrical cables necessary to control letdown from the Reactor Coolant System (RCS) may be affected by a fire in the annulus.

3.4.2 Purpose

To evaluate the effects of a fire on certain safety-related circuits in the Unit 2 annulus. The cables evaluated are redundant trains required to achieve a RCS letdown path through the pressurizer PORVs and Block valves or the head vent valve.

3.4.3 Evaluation

3.4.3.1 Analysis of Area No. 1 - Location of Cables

The area of AZ 209° to 290° contains both train A and train B cables. The train B cables in cable tray IE-B elevation 758' and in cable tray PI-B, elevation, elevation 756', and train A cables in conduit 2V5687A (approximate elevation 725'), are vertically 30 feet apart at their closest point.

3.4.3.1.1 Key Considerations

1. The train B cables are in the stack of four trays from elevation 753'-7" to 758'-0". The train A cables are in rigid conduit mounted to the concrete shield wall.
2. The area from AZ 200° to 250° has partial sprinkler protection at approximately the 740' elevation.
3. The personnel air lock provides a partial radiant energy shield at AZ 248° to 262°.

4. The equipment air lock provides a partial radiant energy shield at AZ 272 to 290°.
5. The walkway at elevation 740'-6" provides a partial radiant energy shield from AZ 200 to 290°.
6. There are no intermediate combustibles from AZ 200 to 290° which could propagate combustion from conduit 2V5687A to the redundant trays above.

3.4.3.1.2 Observations

1. Due to the physical separation, partial sprinkler system, partial radiant energy shielding, and lack of intermediate fixed combustibles, it is not creditable that a single fire could impair both sets of circuits considered herein.
2. Train A cables in conduit 2V4587A and train B cables in conduit 2V5667B come together in close proximity at AZ 280°, approximate elevation 725. Their common failure is acceptable and is not considered in this analysis.

3.4.3.2 Analysis of Area No. 2A - Location of Cables

The area of AZ 0° to 25° at elevation 710' to 721' contains both train A and train B cables. The train A cables in cable tray IT-A and in cable tray PW-A, and train B cables in conduit 2V5667B are less than 4 feet apart where train B cables enter containment penetration 28. The B train cables exit conduit 2V5667B and pass along the open cable tray to penetration 28.

3.4.3.2.1 Key Considerations

1. The cables are exposed and unprotected.
2. A fire in the area of penetration 28 could affect both the train A and train B cables at AZ 25
3. This arrangement does not provide adequate separation.
4. The area of AZ 17° to 0° at elevation 695' to 710' contains many of the same cables in tray as stated above and in conduit 2V5667B below. Three existing sprinkler heads provide adequate protection between the two cable trains in this region.

3.4.3.2.2 Recommendations

Additional sprinklers should be added to provide protection for cables required to assure a RCS letdown path. RESOLUTION: Recommended modifications were completed by design change notices.

3.4.3.3 Analysis of Area No. 2B - Location of Cables

The area of AZ 260° to 317° below elevation 720' contains both train A and train B cables. Train A cables in cable tray IT-A and cable tray PW-A and train B cables located 23 feet below in conduit 2V5667B. The A-train cables are in the stack of four cable trays. The B-train cables are in rigid conduit mounted to the concrete shield wall.

3.4.3.3.1 Key Considerations

1. A-train cables transfer to cable tray PW-A at AZ 320 and exit on cable tray OU-A. A-train

cable 2V2451A transfers to cable tray IT-A at AZ 310 and travels vertical in cable tray HT-A.
2. There are two cable trays that run vertically at AZ 225 from below elevation 695' toward the redundant circuits above. One of these trays is empty. The other has few cables in it, most of which are Flamemastic coated. Partial sprinklers are installed above at elevation 719', AZ 338
3. The area has partial sprinkler protection from AZ 360 to 305°.
4. The walkway at elevation 701"-6" provides a partial radiant energy shield from AZ 360 to 317°.

3.4.3.3.2 Observations

Due to the physical separation, suppression system, shielding, and lack of intermediate fixed combustibles, it is not creditable that a single fire could impact both conduit 2V5667B and the redundant trays above.

3.4.3.4 Analysis of Area 3 - Location of Cables

The area of AZ 300° to 325° at elevation 718' to 758' contains both train A and train B cables.

The circuits in this area located in cable tray PH-B, PI-B, IE-B, and IG-B with corresponding redundant circuits located in cable trays IT-A and PW-A.

3.4.3.4.1 Key Considerations

1. The train B circuits are separated vertically from train A circuits by a distance of at least 30 feet.
2. There are no intervening combustibles between the redundant cable trays from AZ 318 to 335°.
3. The trays located between elevation 756' and 758' are protected with partial area coverage sprinklers.
4. Intervening combustibles in the form of vertical cable trays are located between AZ 318 to 305°.

3.4.3.4.2 Observations

1. It is not creditable for a fire involving one train of circuits between AZ 318 to 335° to propagate to the redundant train.
2. There are two very lightly loaded horizontal cable trays at elevation 736' and 737'. The majority of cables in the two trays are Flamemastic coated. Their contribution to a fire would be minimal.
3. A fire originating in the lower horizontal trays (AZ 318 to 305°, elevation 718' to 720' could propagate to the upper horizontal trays (elevation 756' to 758'), via the path provided by the vertical trays.

3.4.3.4.3 Recommendations

Additional sprinklers should be added to provide protection for cables required to assure a RCS letdown path. RESOLUTION: Recommended modifications were completed by design change notices.

3.4.4 Summary

The analysis of area 1 demonstrates that a fire capable of damaging both sets of redundant cables is not creditable. This conclusion is based on the cables orientation, partial sprinkler protection, partial radiant energy shielding, and lack of fixed combustibles in the area.

The analysis of area 2A demonstrates that a fire is capable of damaging both sets of redundant cables at AZ 25°, elevation 715'. The recommendation identified for area 2A have been incorporated.

The analysis of area 2B demonstrates that a fire capable of damaging both sets of redundant cables is not creditable. This conclusion is based on cable orientation, sprinkler protection, partial radiant energy shielding, and lack of fixed combustibles in the area.

The analysis of area 3 has demonstrated that a fire is capable of damaging both sets of redundant cables at AZ 305° to 315°, elevations 756' and 758'. The recommendation identified for area 3 have been incorporated.

3.5 Analysis of Selected RCS Letdown Circuits in the Unit 1 Annulus - SQN-00-D052/EPM-MHS-052588, R0

3.5.1 Statement of Problem

The electrical cables necessary to control a letdown from the Reactor Coolant System (RCS) may be affected by a fire in the annulus.

3.5.2 Purpose

To evaluate the effects of a fire on certain safety-related circuits in the Unit 1 annulus. The cables evaluated are redundant trains required to achieve a RCS letdown path through the pressurizer PORVs and block valves or the head vent valve.

3.5.3 Evaluation

3.5.3.1 Analysis of Area No. 1 - Location of Cables

The area of AZ 205° to 280° contains cables in conduit IV5687A at elevation 728' and cable tray PF-B and HU-B at elevation 757'.

3.5.3.1.1 Observations

The two circuits do not have 20' horizontal separation as required by Appendix R, Section III.G, "Fire Protection of Safe Shutdown Capability." By providing automatic suppression and detection, this alternative will be acceptable and in accordance with Section III G.2(e) of Appendix R.

The sprinkler heads currently in place (C35-43) provide protection from AZ 200° to 260° between elevation 760' to 750'.

3.5.3.1.2 Recommendations

1. Add one additional sprinkler head at AZ 270, elevation 759'.
2. Add one additional detector at approximately AZ 271, elevation 763'. This detector shall be on the opposite zone of the closest existing detector.

RESOLUTION: Recommended modifications were completed by design change notices.

3.5.3.2 Analysis of Area No. 2 - Location of Cables

The area of AZ 315° to 325° contains the continuous cable tray run composed of cable tray sections NV-A, PS-A, RP-A and conduit IV5702A and junction box 4500. The cables span approximately elevation 705' to elevation 750'.

3.5.3.2.1 Observations

The area at approximately AZ 30-20, elevation 710' is extremely congested with cables entering the penetration. The vertical section located at AZ 320, is also a congested area. The circuits do not meet the 20-foot horizontal separations as required by Appendix R, Section III G, "Fire Protection of Safe Shutdown Capability." By providing automatic suppression and detection for the continuous cable tray run, this alternative will be acceptable and in accordance with Section III G.2(e) of Appendix R.

3.5.3.2.2 Recommendations

1. Three sprinkler heads will have to be added in the area of AZ 30-20
   - One at AZ 27° approximate elevation 721'-6".
   - One at AZ 20° approximate elevation 721'-6".
   - One at AZ 20° directly under the cable tray from penetration 27.

   In order to ensure reasonable operating time, the sprinkler head should be located within 4" of the bottom of this cable tray. This will form a "ceiling" above the added sprinkler head.
2. Two cross-zoned detectors shall be located at approximately AZ 27 and 22° at elevation 725'.
3. The area from approximately AZ 310 to AZ20°, elevation 721'-6" will need full area coverage. This will require sprinkler heads at AZ 5, 353°, 343°, 337°, 324°, and 317°. The four sprinkler heads at AZ 340° approximate elevation 722' (C29-32) can be relocated for this area protection. The present location of the sprinkler heads is in violation of NFPA 13-1987, Section 4-4.19 due to their close spacing. Upon operation of one of the four sprinkler heads in the current configuration, the operating head's water discharge pattern would delay or disable the remaining sprinkler heads. By relocating the four sprinkler heads and adding the additional sprinkler heads and detectors, the protection in this area will be superior to that of the existing configuration. The previous interaction at the existing sprinkler heads location will have an increased level of protection with the new configuration.
4. Two additional cross-zoned detectors shall be added at approximately AZ 356 and 8°, elevation 726'. These detectors shall be on alternating zones of the detectors currently in place.

RESOLUTION: Recommended modifications were completed by design change notices.

3.5.3.3 Analysis of Area No. 3 - Location of Cables

At AZ 310°, elevation 757', cable trays HN-A and PF-B pass within 3 feet of each other.

3.5.3.3.1 Observation

In order to prevent a spurious interaction caused by fire, protection will have to be provided between the two cable trays. The present location of the two existing sprinkler heads (C2, C3) does not provide protection for the open front of the cable tray HN-A.

3.5.3.3.2 Recommendation

By relocating sprinkler head C3 to the interface of these two cable trays (AZ 310 elevation 757') the interaction can be prevented and protection for cable tray HNA is still provided. Sprinkler head C2 shall be relocated to approximately AZ 320, elevation 740 feet to provide intermediate protection of cable tray NV-A as stated in Analysis of Area No. 2. Detector modifications in the analysis of Area No. 4 provides enhanced protection.

RESOLUTION: Recommended modifications were completed by design change notices.

3.5.3.4 Analysis of Area No. 4 - Location of Cable Trays

The area of AZ 305° to 340° contains cable trays JH-A, PJ-A, KI-A, PI-A, and HN-A at elevation 772' and cable trays HU-B, HS-B, GG-B, PF-B, PO-B, and OS-B at elevation 750' to 758'.

3.5.3.4.1 Observation

The two redundant trains of cables do not have 20-foot horizontal separation as required by Appendix R, Section III G, "Fire Protection of Safe Shutdown Capability." By providing automatic suppression and detection, this alternative will be acceptable and in accordance with Section III G.2(e) of Appendix R.

3.5.3.4.2 Recommendations

The four existing sprinkler heads (C4-7) at AZ 320, elevation 760' shall be relocated to provide better area protection. The sprinkler heads are presently in violation of NFPA 13-1987, Section 3-8.4. Upon operation of one of the four sprinkler heads in the current configuration, the operating head's water discharge pattern would delay or disable the remaining sprinkler heads. By relocating the four sprinkler heads and adding two detectors, the protection in this area will be superior to that of the existing configuration. The previous interaction at the existing sprinkler heads location will have an increased level of protection with the new configuration.

- One sprinkler head shall be relocated to approximately AZ 315, elevation 758' directly above cable tray NV-A.

- The remaining three sprinkler heads shall be relocated at AZ 322, 328°, and 335° at elevation 758'.

Two additional detectors will have to be added at AZ 335 and 305°, elevation 768'. These additional detectors enhance the modifications described in the analysis of Area No. 3.

RESOLUTION: Recommended modifications were completed by design change notices.

3.5.4 Summary

3.5.4.1 Area No. 1

With the implementation of the recommendations stated above (one new sprinkler head and one new detector), this protection complies with the intent of Appendix R, Section III G.2(e).

3.5.4.2 Area No. 2

With the implementation of the recommendations stated above relocating four sprinkler heads, adding five new sprinkler heads, and adding four new detectors and the recommendations in analysis of areas 3 and 4, the protection complies with the intent of Appendix R, Section III G.2(e).

3.5.4.3 Area No. 3

With the implementation of the recommendations stated above (relocation of the sprinkler heads) and the recommendations in Analysis of Area No. 4, the protection prevents spurious interaction of the two cable trays in the event of a fire. The previous interaction at the existing sprinkler heads location has an increased level of protection with the new sprinkler head location and additional detectors.

3.5.4.4 Area No. 4

The relocation of the four existing sprinkler heads and the addition of the two new detectors complies with the intent of Appendix R, Section III G.2(e).

3.6 Analysis of the 125-V Battery Board Rooms, SQN-00-D052/EPM-MHS-111188, R0

3.6.1 Statement of Problem

Electrical cables in cable trays and control boards in the 125-V battery board rooms I, II, III, and IV do not meet the separation requirements of Appendix R, Section III.G.2. The rooms contain ionization smoke detection and manually actuated suppression.

3.6.2 Purpose

The purpose of this calculation is to demonstrate fire protection safe shutdown capability by evaluating the effects of a fire on certain safety-related circuits in the 125-V battery board rooms (I, II, III, and IV).

3.6.3 Evaluation

The calculation does demonstrate the slow fire development and possible oxygen-starved fire. The condition could lead to abackdraft condition. If the fire is in an advanced oxygen-starved stage, improper opening of the door for investigation (introducing oxygen to the room) could produce a smoke explosion (backdraft).

To comply equivalence with the 1-hour ASTM E119 test curve, the area under the curve for the forced ventilation fire is calculated. It is assumed the room is instantaneously heated to 568.4F and remains at that temperature (due to the forced ventilation).

In the worst case forced ventilation fire, the 1-hour rated protection will protect the circuits between 2 to 2-1/2 hours.

3.6.4 Summary

This calculation documents worst case fire scenarios (i.e., fully loaded cable trays with no Flamemastic, highest heat of combustion for cable insulation, instantaneous burning, etc.). The 1-hour rated fire wrap will survive at least the first hour of any fire caused byinsitu combustibles in the room. This allows the operators twice the time needed to react. In reality, a fire of the severity addressed in this calculation is not probable based on actualinsitu combustibles. This calculation analytically demonstrates several different postulated fire scenarios. The calculated fire severity in the first hour of a fire is less than the ASTM E119 time temperature curve. Any conduits protected with the one hour rated wrap should not fail in the first hour of a fire. This calculation provides detailed justification to allow a permanent deviation for the circuits not in strict compliance with Appendix R, Section III.G.2. The NRC approved a permanent deviation (refer to Part VII, Section 2.18).

3.7 Analysis of Unit 2 Neutron Source Range Cables on Elevation 690' in the Auxiliary Building, SQN-00-D053/EPM-MHS-053089, R1

3.7.1 Statement of Problem

Rerouting the source range circuits in the Auxiliary Building may affect compliance with Appendix R, Section III.G.2.

3.7.2 Purpose

To evaluate the effects of a fire on the relocation of Channel I neutron source range cables and the onsite power supply for B train equipment. Channel I neutron source range cables are associated with train A power supply and Channel II neutron source range cables are associated with train B power supply.

To evaluate the effects of a fire in the Auxiliary Building on the Channel I neutron source range cable and the train B onsite power supply, a detailed fire hazard analysis has been performed in accordance with the guidelines set forth by the NRC in 10CFR50 Appendix R, Section II.B, NUREG 0800, CMEB 9.5.1, Section C.6, and NRC Generic Letter 86-10, Section C.

3.7.3 Evaluation

The rerouted Channel I neutron source range cable will be routed to ensure the cable is at least 31 feet from the unprotected HVAC duct opening. The B train power cables are located on elevation 714' above the duct.

The cables are separated by the 714' elevation concrete floor. The HVAC duct does not have a fire damper in the 714' floor. The circuits above this area are in conduit, which does not constitute intervening combustibles. There are 4-1/2 330-pound cardboard drums of boric acid (ORTHOBASIC ACID) in the area. Boric acid is noncombustible and is also used as a Class D extinguishing agent. The general housekeeping in the area is good.

The floor area in elevation 690', including the area above the boric acid tanks (A13-A11) is sprinklered (DCN M-14226-A installed additional suppression and detection in the BAT area). The floor area on elevation 714' is sprinklered. The areas have smoke detection to actuate the preaction valves. The cable trays are protected withFlamemastic coating as required.

The sprinkler system also provides floor coverage under large obstructions.

A fire originating in the area of the new Channel I cable (column A15 to 10' north of A13) should be controlled by the area sprinklers. If the fire was to propagate north, it would have to travel above the boric acid tanks to the HVAC duct. This is not expected due to the lack ofinsitu combustibles and the minimum 31 feet distance. The fire would then have to breach the metal HVAC duct to gain access to elevation 714'. The area around the HVAC duct is protected by obstruction sprinklers. It is expected these sprinklers would control any fire breaching the opening. If the fire could overpower the obstruction sprinklers, the 714' elevation is fully sprinklered and would control the fire before cable failures.

A fire originating on the 714' elevation does not have a physical path to the lower 690' elevation. Therefore a fire involving the train B power supply on elevation 714' could not disable the Channel I neutron source range cables.

3.7.4 Summary

Based on the multiple levels of sprinkler protection, physical separation, lack ofinsitu combustibles, and good housekeeping practices, the rerouting of the Channel I neutron source range cable is acceptable.

3.8 Analysis of Unit 1 Neutron Source Range Cables in the Auxiliary Building, SQN-00-D052/EPM-EAC-070589, R0

3.8.1 Statement of Problem

The proposed routing for the neutron source range instrumentation for Unit 1 traverses an area that is not provided with "full area" automatic detection and suppression. In order to comply with the separation requirements of 10CFR50 Appendix R, Section III.G.2, an evaluation is required to assess the adequacy of the existing partial area suppression and detection for the hazards in the area.

3.8.2 Purpose

To evaluate the absence of full area automatic fire suppression and detection for the neutron source range Channel II cables being routed through the Auxiliary Building on elevation 690' in the area between column lines A3 to A6 and from Q to S (above the waste gas compressor rooms). The onsite electrical power supply cables for the redundant neutron source range channel are located on elevation 714' above. An unprotected HVAC opening exists between A5-A6 and Q-R between the two floors.

3.8.3 Evaluation

Limited amounts of transient combustibles will be located periodically in the area above rooms A25 and A26 which has no automatic sprinkler fire suppression and detection. The existence of adequate detection and sprinkler protection in the adjacent area extending to the unprotected (no fire damper) duct penetration through the ceiling to the floor above, is adequate to assure that a fire in the unprotected area above the waste gas compressor rooms A25 and A26 will not propagate through the unprotected duct penetration to elevation 714'. The sprinkler system is adequate to keep a fire originating in the floor area below the duct penetration area from spreading to the roof area above rooms A25 and A26. It is therefore satisfactory to route the neutron source range cables through the unprotected area above the waste gas compressor rooms A25 and A26 since the other cables are located on elevation 714'. The new conduit is located in a sprinklered area and will be fire wrapped to achieve a one-hour barrier until a minimum of 20 feet of separation exists from the other required cables.

3.8.4 Summary

This analysis has shown that the proposed routing of the neutron source range monitoring cables comply with the separation requirements of 10CFR50 Appendix R Section III.G.2 for the unprotected area above the waste gas compressor rooms and withSequoyah's approved intervening combustibles Deviation No. 11 to Appendix R for the routing through the sprinkler protected area of the Auxiliary Building.

3.9 Analysis of Neutron Source Range Monitoring Cables in the Unit 1 Annulus, SQN-00-D052/EPM-DAB-120189, R0

3.9.1 Statement of Problem

The routing of the new Channels I and II neutron source range monitoring cables must be evaluated to assure they comply with the requirements of 10CFR50 Appendix R. This fire hazard analysis provides the needed evaluation for these cables inside the Unit 1 annulus.

3.9.2 Purpose

To evaluate the effects of a fire on the neutron source range cables relocation in the Unit 1 annulus. The cables evaluated are redundant Channels I and II, required to monitor the reactors neutron flux at its lowest shutdown level. This calculation was performed in order to verify that the new neutron source range cable routing meets the requirements of 10CFR50 Appendix R.

3.9.3 Evaluation

The proposed route for the Channel I cable is AZ 205 (penetration 43) at 712' up to 717' and AZ 207°. The Channel I cable then runs horizontal to AZ 222 where it then turns vertically upwards to 751'-6"

directly below sprinkler head C41. The Channel I cable then runs horizontally to AZ 240 where it exits the annulus through a spare penetration in the cluster of penetrations located at elevation 753'. The Channel I conduit is routed outside the Reactor Building shield wall in the Unit 1 Reactor Building access room 734.0-A12 and then through the Unit 1 Reactor Building equipment hatch room 734.0-A11 near the ceiling. Room 734.0-A11 is connected to the annulus in modes 5 and 6 when the blast doors are open. The Channel II source range cable is a vertical conduit located at AZ 333 approximately elevations 705' to 715'.

The redundant source range cables are separated by approximately 93 feet horizontally when the blast doors are closed. The horizontal separation contains a small amount of insitu combustibles, mostly consisting of cable trays, pipe duct and insulation. The Reactor Building equipment hatch room has full area automatic fire suppression sprinklers installed as shown on drawing 47W491-5.

The area between the redundant neutron source range cables contains 12 sprinkler heads at various locations. There are 15 additional heads above, below, and to the sides of the two cables. These sprinkler heads provide protection and/or separation for other cable interactions in the annulus. The area is also provided with cross-zoned smoke detectors to actuate the preaction sprinkler system and provide fire alarm functions in the main control room. When the blast doors are open into room 734.0-A11, the area in this room becomes common to the annulus. Rooms 734.0-A11 has a full area automatic preaction sprinkler system.

There are no continuous combustible paths between the two channels above the elevation 759'-6" platform. A fire originating in this area will not disable both channels of neutron monitoring cables.

A fire originating in the area of Channel I and disabling it should be controlled by sprinkler heads C1, C35-C42, and C45. If the fire were to escape from the area protected by these heads and propagate along the cable trays below the 759'-6" platform towards the Channel II cable, it would be controlled by sprinkler heads C2-7, C29-30, and C46-47. Likewise, these heads will perform the same functions for a fire in the reverse direction starting in the Channel II area and propagation towards the Channel I cable along this path.

For a fire occurring below the Channel I cable and disabling it, the spread of fire along the cable trays beneath the elevation 721'-6" platform would be stopped by sprinkler heads C46-C47 prior to reaching the Channel II cable. These heads will also prevent a fire along this path in the reverse direction from reaching Channel I.

For a fire beneath the Channel II cable and disabling it, sprinkler heads C27-31, C33, C46, and C47 will prevent fire propagation to the Channel I cable. If a fire were to start in the cable tray beneath the 701'-6" platform in the vicinity of Channel II, the platform will shield the Channel II cable from radiant heat energy. The Channel II exposure would be limited to convection heat transfer. This same convection heat transfer would actuate heads C46 and C30 which will cool the Channel II cable. Fire propagation towards the Channel I area in this tray would be controlled by sprinkler head C33.

For a fire occurring in the area of Channel I cable there are no significant combustibles below the 701'-6" platform and therefore no connection fire path between Channels I and II below 701'-6".

Sprinkler heads C30 and C46 are above and to either side of the short vertical run of Channel II cable.

If the blast doors are open into the 734.0-A11 equipment hatch room, a fire propagating from the Channel I side of the annulus would have already disabled the Channel I cable and therefore the Channel I cable in the room 734.0-A11 is no longer a concern. The Channel II cables would still be protected by sprinkler heads C27, C29, C39, C46 and C47.

A fire originating in room 734.0-A11 would disable Channel I cables, but the Channel II cables will still be protected by the sprinkler heads C2-7, C29, C39, C46 and C47. A fire originating in room 734.0-A11 would be controlled by the automatic pre-action sprinkler system installed in this area.

A fire originating in the Channel II area and propagating towards the Channel I area while the bast doors are open would be no different than if the blast doors were closed because of the full area coverage automatic pre-action sprinkler system in room 734.0-A11.

3.9.4 Summary

This calculation is based on the routings of the neutron source range cables as determined during the routing and fire hazard analysis walkdown and described in this calculation. The 93-foot spacing between the Channel I and II cables (37 feet with blast doors open) in addition to the current levels of fire detection and suppression along these routes provide adequate protection to *assure that no creditable fire in the annulus can disable both channels of neutron source range monitoring cables.

3.10 Penetration Fire Seals for 714.0 1-Hour Fire Wall, SQN-AR-D052/FSG-SLK-120485, R1

3.10.1 Statement of Problem

Three sets of the flexible boot seals delivered to the site did not fit properly. Due to time constraints, the boots will not be reordered. A flexible caulk type fire seal will be used in their place.

3.10.2 Purpose

The purpose is to evaluate the suitability of using Promaflex brand sealant as a substitute for the Gortiseal brand zippered boot to seal three pipe penetrations in a one-hour gypsum board wall, and to qualify a fourth pipe penetration (Aux. Bldg. Mechanical Sleeve Mk #'s 1810, 1811, 1812 & 1813).

3.10.3 Evaluation

The four subject penetrations were originally designed to be sealed with a flexible zippered boot seal configuration (Type XIII), as detailed on Dwg. 1,2-47W472-4. Due to an error in ordering, the boot seals delivered to the site for three of the four penetrations did not fit properly and could not be used without extensive modifications to the penetration configuration. The boot seals for the fourth penetration fit properly and were used. For the remaining three penetrations, Promaflex, a flexible caulk type fire sealant, was installed instead.

Promaflex is manufactured by B&B Insulation Incorporated, and was tested under the original product name of Fireflex, by Southwest Research Institute of San Antonio, Texas. The evaluation compares the TVA installation for the three subject penetrations to Penetration 1025.4 of the manufacturer's test. Based on factors such as additional damming material and smaller annular gaps between penetrants and sleeves, the TVA configuration was determined to be bounded by the tested configuration.

Appendix A to the calculation evaluates the fourth penetration, which was sealed with the originally designed silicone impregnated fiberglass fabric boot seal. It was compared to Promatec Fire Test CTP-1063, Penetration 6.1.9. The most significant difference between the as-built configuration and the tested configuration is that the as-built model consists of a 4" pipe, compared to the 2" penetrant used in the tested assembly. A larger pipe will conduct more heat through the penetration, which could impact the integrity of the seal. However, the required rating for the seal assembly is only 1 hour, as opposed to the 3 hour rating achieved in CTP-1063. The temperature readings in the test were well below the acceptance criteria limits. Therefore, it was determined that the slightly larger pipe size will not provide significant additional heat transfer to impair the fire resistance qualities for a 1 hour rating.

3.10.4 Summary

The investigation shows that the three replacement penetration seals maintain the integrity of the 1-hour fire-rated wall and are acceptable for the intended use. Also, the configuration of the fourth penetration seal, which used the originally designed boot seal was determined to be acceptable as a1-hour fire rated seal.

3.11 Analysis of a Fire Barrier on Elevation 714' in the Auxiliary Building, SQN-00-D053/EPM-MHS-020491, R0

3.11.1 Statement of Problem

Evaluate the partial fire barrier (fire partition) at column line A8/q-r to verify it is adequate to provide separation between redundant cables that do not meet the 20' separation criteria.

3.11.2 Purpose

To evaluate the fire load in the vicinity of the barrier and the expected fire severity. The fire barrier provides physical separation for Appendix R cables.

3.11.3 Evaluation

The fire barrier on 714' is not a fire wall but a fire partition providing spatial Appendix R protection. The barriers design is based on a tested UL design configuration and meets the intended use as a fire partition. The insitu combustibles in the immediate area are very low. The area is protected by ceiling level and obstruction sprinklers. The thermal expansion calculation assumes a fire in this area will follow the standard time/temperature test curve. Based on the actualnsitu combustibles and sprinkler system operation at 212° F those temperatures are not likely to be reached.

3.11.4 Summary

Based on the special function of the fire barrier, the lack ofnsitu combustibles, the multiple levels of sprinkler protection, and the good housekeeping practices, the fire barrier adequately performs its designed function and is acceptable as is.

3.12 Analysis for Unit 2 Appendix R Cables Above Valve Gallery Mezzanine, Elevation 690'

Auxiliary Building, SQN-00-D052/EPM-ERS-081491, R0

3.12.1 Statement of Problem

The existing routing for seven Appendix R cables for Unit 2 traverses an area above the mezzanine that is not provided with automatic detection and suppression. In order to comply with the separation requirements of 10CFR50 Appendix R Section III.G.2, an analysis is required to assess the adequacy of the existing partial area suppression and detection for the hazards in the mezzanine area at elevation 702'.

3.12.2 Purpose

To evaluate the absence of full area automatic fire suppression and detection for the Auxiliary Building valve gallery mezzanine area which has conduit containing Unit 2 Appendix R cables. The specific mezzanine area is above elevation 690' at an approximate elevation of 702' and is bounded by column lines A12 and A13 and column lines T to U. These cables are in conduit and are wrapped with a one-hour fire wrap and are located in the ceiling area above the mezzanine.

3.12.3 Evaluation

The cables identified above the valve gallery mezzanine have one-hour fire wrap over the existing conduit enclosing the particular cables. The maximum fire severity for one hour is 80,000 BTU/sq. ft. Since the total combustible floor loading for the Unit 2 mezzanine has been calculated to be 5,099 BTU/sq. ft., the average time for a fire to be involved is 3.8 minutes.

Based on this conservatively calculated value, which shows there are insufficient fixed and transient combustibles in the area, the one-hour wrapped cables should easily survive any creditable fire in the mezzanine area.

It is reasonable to conclude that the cables would survive any creditable fire in the area without any supplemental fire suppression measures. In any event, fire brigade members would be expected to arrive in a very short time due to the easy access to the area and its close proximity to the main access door into the Auxiliary Building. A fire hose rack with 100 feet of 1-1/2-inch hose is located within 20 feet of the mezzanine on 690'.

3.12.4 Summary

The analyses have shown that the seven cables routed in the mezzanine area are enclosed in conduit and wrapped with a one-hour fire wrap. This is within the limits of the NRC approved Deviation No. 12 for areas having no fire detection or suppression and low combustibility loadings. This area does not present a significant fire exposure to the redundant safe shutdown components and complies with the intent of the separation requirements of 10CFR50, Appendix R, Section III.G.2 for the unprotected mezzanine area.

3.13 Analysis of the Unit 1 Appendix R Cables Above Valve Gallery Mezzanine, Elevation 690', Auxiliary Building, SQN-00-D052/EPM-AMJ-081691, R0

3.13.1 Statement of Problem

The existing routing for the Appendix R RWST outlet valve cable (IV4003A) for Unit 1 traverses an

area that is not provided with automatic detection and suppression. In order to comply with the separation requirements of 10CFR50, Appendix R, Section III.G.2, an analysis is required to assess the adequacy of the existing partial area suppression and detection for the hazards in the area.

3.13.2 Purpose

The purpose of this calculation is to evaluate the absence of full area automatic fire suppression and detection for the area containing an A-train cable above the Unit 1 valve gallery mezzanine in the Auxiliary Building on 690' in the area between column lines A3 to A4 and from t to u. These cables are in conduit and are wrapped with a one-hour fire wrap.

3.13.3 Evaluation

The RWST outlet valve cable (IV4003A) has a one-hour rated fire wrap. The fire severity for one hour equates to 80,000 BTU/ft^2. The total combustible floor loading is 9,070 BTU/ft^2 implying that the extent of a fire is less than 7 minutes.

Based on this value, the one-hour wrapped cable should easily survive any creditable fire in the area. Therefore, there is insufficient combustibles in this area of influence to compromise this cable.

Considering that the tabulation of combustibles represents a conservative bounding (conservatisms were noted in the individual tabulations of this calculation), the fire severity is actually much less than 7 minutes.

It is reasonable to conclude that the cable in this area will be unaffected from any creditable fire. Even so, the fire fighting personnel could be expected to be in attendance of a fire in this area within one hour. This location being on elevation 690' of the Auxiliary Building is accessible for fire fighting control. This general area can be reached in less than a minute from the main entrance door to the Auxiliary Building. It is immediately adjacent to theaisleway. Although unnecessary, this is further assurance of cable operability.

3.13.4 Summary

This analysis has shown that the existing route of the train A RWST outlet valve cable with a one-hour wrap and the absence of any significant combustible material is adequately protected. This is within the bounds of the NRC approved Deviation No. 12 for an area having low combustibility loading and no fire detection and/or automatic suppression. This space does not present a significant fire exposure to redundant safe shutdown components and complies with the intent of the separation requirements of 10CFR50, Appendix R, Section III.G.2 for the unprotected mezzanine area.

3.14 Through-Penetration Firestop Seals in the Auxiliary Bldg. El. 714.0 Appendix R Firewall, SEQ-00-D053/FSG-WCB-081586, R2

3.14.1 Statement of Problem

The 1-hour Appendix R firewall located on El. 714.0 is penetrated by conduit, pipe, monorail, and a cable tray blockout. The firestop systems used to seal the penetrations are not listed or approved, and need to be evaluated to determined if they will maintain the fire resistance rating of the wall.

3.14.2 Purpose

The purpose of the calculation is to determine if existing pipe, conduit, monorail, and cable tray through-penetration firestop systems in the El. 714.0 Appendix R firewall will maintain the continuity of the wall's 1-hour fire resistive rating.

3.14.3 Evaluation

The 3 pipe penetrations discussed in this calculation are sealed with Promaflex brand fire sealant material, and were evaluated in detail in Calculation SQN-AR-D052/FSG-SLK-120485 (See 3.10 above). Based upon a comparison with a manufacturer's test data, the configuration was determined to be acceptable. The configuration is further justified since the seal assembly is a 3-hour configuration and is installed in a one hour barrier.

The two monorail penetrations have been sealed using Dow-Corning 3-6548 silicone foam. The seal assembly compares favorable with Dow Corning Design #5, which was tested by Warnock Hersey International, and was found to meet the requirements for a 2 hour "F" rating. The "T" rating for the assembly was only for 54 minutes. However, the distance of the cable tray (the most significant source of intervening combustibles) closest to either of the monorails is 6 inches above and 12 inches to the side of the monorail. In the event of a fire, the flanges and web of the monorail would dissipate a portion of the heat conducted through the wall by radiation and convection before the monorail reaches the proximity of the cable trays. Since the cable trays are not directly above the monorail, they are outside the primary vertical convective path and would not be significantly affected. At the point where the trays and the monorail are closest, the radiation is considered negligible due to the distance from the cold side wall face. Also, suppression installed in the vicinity would cool the monorail and minimize the effects of heat propagation.

The annular gaps between the barrier penetration and the conduit and exposed cable penetrants are sealed with Dow Corning 3-6548 silicone foam. The test used to qualify the penetration seals is WHI test PSV-0445/446. The tested configurations were installed in a 2-hour fire rated wall that was designed in accordance with Gypsum Association designs WP 1548. The tested configurations compare favorably with the TVA configurations in that both systems use gypsum walls that are similar in construction and both require the use of a framed penetration to retain the position of the foam. Also used for comparison was a UL listed configuration (No. 7), which is a 16 inch square blockout with RTV foam installed to a depth of four inches in an 8 inch concrete block wall. The areas of sealant material for all of the TVA installations are less than those of the tested configurations, which presents less exposure of the seal to a fire. Also, the UL configuration was tested successfully for a 2-hour rating both with and without damming material. The TVA configurations do not include damming boards.

The cable tray seal configuration was compared to Factory Mutual Test J.I.1A5Q5.AC, in which the subject penetration was sealed with a 3 ¼" depth of silicone foam and a ½" damming board coated with Type 77 Flammastic fire-retardant material. Although the tested assembly did not meet the temperature rating criteria for a 3 hr. exposure, the acceptance criteria which SQN cable tray penetrations must satisfy (IEEE 634-78) was met. The cable tray penetration seal installed in the 1 hr. barrier on El. 714.0 is bounded by the limiting parameters of the test, except that the as-built cable tray penetration configuration does not have a Flammastic coating on the face of the seals. However, the cables are coated with Flammastic in the trays on either side of the barrier. This would prevent the propagation of flame up to the penetration seal. Also, the as-built configuration has a foam depth of 4 ¼", which is a full inch thicker than the tested configuration.

Finally, the as-built penetration seal utilizes a 1" Damming board on both sides of the barrier, as opposed to the tested seal, which had only 1 layer of ½" damming board on the exposed side of the barrier.

3.14.4 Summary

All existing through-penetration firestop systems for pipe, conduit, exposed cable, monorail, and cable tray penetrations installed in the El. 714.0 1-hr. rated fire barrier are adequately designed to maintain the 1-hour rating of the fire barrier.

3.15 Analysis of Shield Building Pipe Seal Restrictor Plate, SQN-26-D053/EPM-ERS-010493, R0

3.15.1 Statement of Problem

An untested penetration seal has been located in the 3 hour rated shield building wall for main steam and feedwater piping. This calculation evaluates the effects of a fire on the shield building pipe seal restrictor plate assembly. This calculation has been prepared using the guidelines set forth in NRC Generic Letter 86-10 to demonstrate compliance with tested seal configurations.

3.15.2 Purpose

To evaluate the effects of a fire on the reactor shield building pipe seal restrictor plate assembly as detailed on TVA drawing 1-47W470-11 and other drawings. The plate assembly is an untested configuration and is installed in a 3-hour rated fire barrier.

3.15.3 Evaluation

For the seals in question, the main steam and feedwater lines penetrate the shield building wall. Each seal is unique in that a 1/4-inch thick steel close fitting restrictor plate is designed and installed in such a fashion to allow lateral, vertical, and axial movement of the flued head in the penetration. A coated fabric bellows is installed on the main steam valve room side of the penetration. This bellows is attached to the seal assembly bolt flange at the wall and is clamped to the sealed insulation covering the flued head. This sealed insulation stops approximately three inches from the plate on both sides and is a part of the Type I (main steam) and Type II (feedwater) seal detailed on drawing 47W331-1. An air gap does exist between the bellows, wall sleeve, and the sealed pipe insulation. Three inches of mineral wool is installed on both sides of the restrictor plate to allow axial movement. The plate is not a structural support for the flued head. There are no loads that would cause the plate to bend or otherwise lose its integrity if heated, although it would expand in the radial plane due to temperature increases. Any fire would have to propagate through the bellows, the air gap, and the steel plate since it is bound by the flued head at its internal diameter and the outside is enclosed in a double walled steel enclosure attached to the building wall. The fire severity indices of the main steam valve rooms are considered "Insignificant," which corresponds to a fire load of < 6,500 BTU/sq. ft., or a fire duration of less than 5 minutes.

Although a fire inside the reactor shield building could be of greater magnitude (up to 3 hours maximum), the fire load in the area between the building wall and containment vessel would be composed of cable insulation in cable trays. The fire load from the cable trays located near the plate seals would result in a significantly reduced potential to adversely affect the seals.

Sealed insulation and mineral wool is installed in the long annular gap between the flued head and the sleeve to the restrictor plate. This sealed insulation is a part of the Type I and II seals mentioned earlier. There is a three foot span through the wall with an open air gap. This distance affords significant isolation of the restrictor plate from the destructive effects of a fire.

As shown above, a fire would have to propagate through a bellows (outside wall only), the air gap, and the 1/4" thick restrictor plate before the seal assembly would be considered unqualified. This is not expected, as shown below, due to the heavy duty construction of the restrictor plate assembly.

To qualify this type seal for a three hour fire endurance rating without a fire test, it must compare favorably with the physical characteristics of a seal that has passed the test.

7A Type VII seal was selected for the physical comparison. The physical characteristics of this seal are used for comparison in the table that follows:

Physical Configuration	Type VII Seal	Plate Seal
Boot/Bellows, both sides of wall	Boot - Yes	Bellows - No 1 side only
1/4" thick steel restrictor plate	No	Yes
16 gauge (0.0598") flange, collar and sleeve	Yes	No

The Type VII seal has the outer silicon and inner cloth boots installed on both sides of the shield wall. The plate seal has a coated fabric bellows installed only on the outside shield wall side of the seal. No credit is taken for the fabric bellows on the plate seal.

The restrictor plate is approximately four times the thickness of the sheetmetal flange, collar and sleeve. The plate seal has metal thickness of 1/4-inch. It is important to note that the steel restrictor plate does not provide a structural function for support of the flued head piping configuration. Because of this, it is not subject to deformation and failure under load like steel structural members and would function as a fire barrier while being a part of the assembly. As a secondary comparison, the plate seal could be compared to a typical 3-hour rated fire damper. The damper rating is achieved in part due to the thickness of the damper blades, which is normally 10 gauge (0.1345 inch) or less. This compares favorably to the plate seal thickness.

3.15.4 Summary

Since the Type VII seal has been tested and qualifies for a 3-hour fire resistance rating, the additional metal thickness in the plate seal provides a qualified fire barrier and heat sink and is equivalent to an assembly which qualifies as a 3-hour rated seal.

3.16 Analysis of Security Card Reader, SQN-26-D053/EPM-ERS-122293, R0

3.16.1 Statement of Problem

The conduit between card readers do not have internal seals installed. This calculation evaluates the effects of a fire on the card reader assembly and the compares it with a junction box assembly. This

calculation has been prepared using the guidelines set forth in NRC Generic Letter 86-10 to demonstrate compliance when compared to a typical junction box assembly.

3.16.2 Purpose

To evaluate the effects of a fire on the surface mounted card reader assembly and the acceptability of no internal seals installed in the conduit between card readers. For purposes of this evaluation, a comparable sized junction box will be used in conjunction with results from the "Conduit Fire Protection Research Program Final Report" prepared by Professional Loss Control, Incorporated. This report addresses the concerns for supporting the implementation of revised criteria for sealing conduit penetrations in fire barriers and has been reviewed and approved by the NRC.

3.16.3 Evaluation

To qualify the back-to-back card reader configuration for a 1-1/2-hour fire endurance rating, it must compare favorably with a similar component that has been qualified when evaluated. As stated earlier in this calculation, a set of criteria for conduit (noncombustible closure) sealing has been reviewed and approved by the NRC. Although each card reader assembly has a small narrow slot on the face that equals approximately 0.27 square inches, the JB also has a neoprene gasket that is installed under the cover that would burn on the fire side. NRC guidance in Generic Letter 86-10 (Enclosure 1, Interpretations of Appendix R, Section 4, Fire Area Boundaries) recognizes that fire area boundaries need not be completely sealed.

The ASTM E119 fire test Time-Temperature Curve defines fire test times and temperatures. For example, in a 1-1/2-hour fire endurance test the components are subjected to direct flame and increasing temperature from 1000° F at 5 minutes up to a maximum temperature of 1792° F at 1-1/2 hours. Aluminum alloys have melting points generally in the range of 1100-1200° F and a gray iron alloy (Feraloy) has a melting point of approximately 2150° F. For the installed configuration it is reasonable to predict the card reader assembly on the fire side would be consumed (melt) during the 1-1/2-hour test exposure. For the card reader assembly on the cold (unfired) side, the partially filled conduit is the only potential path available to pass flame, heat, or smoke. The masonry block fire barrier would provide a heat sink for the exposed (fire side) end and length of the heated conduit during a test and it is unlikely that enough heat would be conducted through the conduit to melt the cold side attachment. The cold side aluminum assembly would also serve as a heat sink to dissipate heat from the conduit to the cold side. The card reader low voltage (24 volts) wiring is fused to provide overcurrent protection against disabling other doors or equipment should a fire occur.

Recent security modifications have replaced somecardreaders. The new card readers do not have slotted face plates for card insertion. They utilize a surface mounted slidingardreader. The newcardreaders are fabricated from sheet steel or equal. Both of these features contribute to the conservatism of the initial evaluation above.

3.16.4 Summary

For the actual plant configuration the fixed combustible materials are not located in the immediate vicinity of the card readers and card readers on the fire side would not be exposed to intense direct flame and high temperatures for the time required to destroy the assembly, thus protecting the cold side assembly. Should the fire side assembly lose structural integrity, the cold side would maintain its integrity due to lack of direct flame and would function as an integral part of the fire barrier. Therefore, these card reader configurations have adequate physical characteristics to withstand the type fire loads expected and will

function as a fire barrier. The fire areas are sufficiently bounded to withstand the hazards associated with each area and protect important equipment within the area from a fire outside the area.

3.17 Analysis of Diesel Generator Building Fire Dampers, SQN-26-D053/EPM-VTI-101994, R0

3.17.1 Statement of Problem

Fire dampers in rated fire barriers at the Diesel Generator Building must be evaluated due to non-manufacturer approved installation methods. NRC Generic Letter 86-10 type evaluations are required to determine if the dampers are acceptable as is or require repair or replacement.

3.17.2 Purpose

To determine whether the dampers (0-30-592, 594, 613, 619, and 621-624) which are located in the Diesel Generator Building, are acceptable as is or require repair or replacement. The ability of each damper to perform its design function, considering the fire hazards of the associated areas, was determined.

3.17.3 Evaluation

For each damper, it has been shown that either the damper will function as designed, the damper has ductwork installed on one or both sides which will adequately protect the opening, or mitigating features, such as installed automatic suppression and detection systems, will lessen the severity of the fire to which the damper may be exposed.

3.17.4 Summary

None of the subject dampers are required to achieve safe shutdown. Specifically, these dampers are not required to function in order to meet the separation requirements of Appendix R to 10CFR50, Section III.G. Therefore, from a safe shutdown standpoint, each damper is acceptable in its current configuration.

3.18 Analysis of the Fire Protection CO_2 System Panel in the DGB East Wall of Room 722.0-08, SQN-26-D054/EPM-VTI-111494, R0

3.18.1 Statement of Problem

An untested penetration seal is located in the East wall of room 722.0-08 for the fuel oil transfer room CO_2 Fire Protection System.

3.18.2 Purpose

To evaluate the existing CO_2 fire protection panel configuration located in the east wall of the fuel oil transfer room of the Diesel Generator Building as an acceptable penetration seal. The ability of the panel to prevent the passage of flames, water, and hot gases, considering the fire hazards of the associated areas, will be examined.

3.18.3 Evaluation

Penetration Nos. D08722E0002 (1/2" pipe) and D09722W0003 (3" pipe) are associated with the CO_2 fire protection panel (40" x 24") located in the barrier separating the fuel oil transfer room (722-D08) and the corridor (722-D09) of the Diesel Generator Building. The panel is necessary for operating of the C_2O suppression system in room 722-D08. This penetration is not a tested configuration and there are no existing SQN typical details which cover this configuration. There are no safe shutdown cable/equipment within the fuel oil transfer room.

A fire originating in the corridor is expected to consist of ordinary combustibles (Class A) associated with maintenance and operation of the diesel generators or transient materials which are controlled by administrative procedures. These materials are located along the west wall of the corridor away from the fuel oil transfer room. Additionally, the portion of the corridor adjacent to the penetration is narrow and contains doorways to both the fuel oil transfer room and the 2B-B diesel generator making storage of transient combustibles near the penetration highly unlikely. In the unlikely event a fire challenges the penetration, automatic detection resulting in control room alarm followed by activation of automatic suppression which will control the fire is expected. Fire brigade response will ensure the fire is extinguished. In the event of failure of both automatic suppression and detection, the fire is not expected to propagate through the two metal plates of the penetration seal being evaluated. Therefore, based on this information, the penetration is adequate for the hazards resulting from a fire in the corridor.

3.18.4 Summary

Since the existing penetration configuration is completely enclosed and contains no through penetration openings, automatic suppression and detection are present, and the adjacent areas contain extremely low combustible loading, penetrations D08722E0002 and D09722W0003 will function as required to prevent the passage of flames, water and hot gases. No further action is required.

3.19 Analysis of Control Building Fire Dampers, SQN-26-D053/EPM-VTI-113094, R0

3.19.1 Statement of Problem

Sixty-three fire dampers in rated fire barriers within the Control Building must be evaluated due to non-manufacturer approved installation methods. NRC Generic Letter 86-10 type evaluations are required to determine if the dampers are acceptable as-is or require repair and/or replacement.

3.19.2 Purpose

The purpose of this evaluation was to determine whether the dampers located in the Control Building are acceptable as is or require repair or replacement. The ability of each damper to perform its design function, considering the fire hazards of the associated areas, was determined.

3.19.3 Evaluation

For each damper, it has been shown that either the damper will function as designed or mitigating features exist which will decrease the severity of the fire to which the damper could potentially be exposed. These mitigating features may include installed ductwork on one or both sides of the damper, automatic suppression systems, automatic detection systems, low combustible loading, and prompt response of the trained fire brigade. In most cases, a combination of these features exists to adequately protect the opening in

any plausible fire. In all cases, protection of the opening commensurate with the fire hazards of the associated areas can be demonstrated.

3.19.4 Summary

With each damper in its current configuration, existing Appendix R compliance strategies for the affected rooms and/or fire areas are not adversely affected. The separation requirements of 10CFR50, Appendix R, Section III.G are maintained, and the ability of the plant to achieve safe shutdown is not affected.

3.20 Analysis of Auxiliary Building Fire Dampers, SQN-26-D053/EPM-VTI-120894, R0

3.20.1 Statement of Problem

One hundred twenty-five fire dampers in rated fire barriers within the Auxiliary Building must be evaluated due to non-manufacturer approved installation methods. NRC Generic Letter 86-10 type evaluations are required.

3.20.2 Purpose

The purpose of this evaluation was to determine whether the dampers located in the Auxiliary Building are acceptable as is or require repair or replacement. The ability of each damper to perform its design function, considering the fire hazards of the associated areas, was determined.

3.20.3 Evaluation

For each damper, it has been shown that either the damper will function as designed or mitigating features exist which will decrease the severity of the fire to which the damper could potentially be exposed. These mitigating features may include installed ductwork on one or both sides of the damper, automatic suppression systems, automatic detection systems, low combustible loading, and prompt response of the trained fire brigade. In all cases, protection of the opening commensurate with the fire hazards of the associated areas can be demonstrated.

3.20.4 Summary

With each damper in its current configuration, existing Appendix R compliance strategies for the affected rooms and/or fire areas are not adversely affected. The separation requirements of 10CFR50, Appendix R, Section III.G are maintained, and the ability of the plant to achieve safe shutdown is not affected.

3.21 Analysis of Fire Barrier Separating Rooms 706.0-C2 and 706.0-C4, SQN-26-D054/EPM-VTI-012895, R0

3.21.1 Statement of Problem

An untested fire barrier configuration has been located between rooms 706-C2 and 706-C4. This barrier is the floor/ceiling barrier separating the cable spreading room from the corridor.

3.21.2 Purpose

To evaluate the existing 4" concrete floor/ceiling fire barrier including penetration seals separating the cable spreading room (fire area FAA-017) and the corridor at elevation 706' of the Control Building (fire area FAA-016). The ability of the barrier to prevent the passage of flames, water, and hot gases, considering the fire hazards of the associated areas will be examined.

3.21.3 Evaluation

The concrete barrier separating the cable spreading room (706-C02) and the ceiling of the 706' corridor of the Control Building (706-C04) is 4" thick and contains several penetrating items including a cable tray blockout, sleeved penetrations and conduits. This barrier is rated as a 1-1/2 hour fire barrier on the fire protection compartmentation drawing.

The combustible loading of the cable spreading room (fire area FAC-017)is high with a fire severity of greater than 3 hours. The entire combustible load, with the exception of small quantities of trash, consists of cable insulation. There is not a significant amount of combustibles located near the barrier with the nearest cable tray (with the exception of the cable tray penetrating the barrier) being located 2'-3" east of the barrier. The next closest cable trays are located 10'-12' above the barrier. This fire area contains automatic ionization smoke detection which activates a pre-action sprinkler control valve and control room alarm.

The combustible loading of the corridor (fire area FAC-016) is low (i.e., a fire severity of less than 60 minutes). The entire combustible load of this area fire originates in the cable spreading room, is undetected or uncontrolled within the corridor, and is of a proximity to the penetrations to provide sufficient damage to propagate flames downward through the penetrations. Safe shutdown can still be maintained due to the lack of safe shutdown cabling or equipment in the corridor.

3.21.4 Summary

The existing barrier configuration, including penetration seals, is determined to be adequate for the hazards present on both sides of the fire barrier. A fire occurring on either side of the barrier is not expected to challenge the overall ability of the barrier to function as required to prevent the propagation of fire. Additionally, in the event of a fire on both sides of the barrier, safe shutdown capabilities are still maintained.

3.22 Analysis of containment Access Hatches Located on the 734' Elevation of the Auxiliary Building, SQN-26-D054/EPM-VTI-012995, R0

3.22.1 Statement of Problem

An untested penetration seal configuration is located in the Reactor Building access rooms (734-A12 and 734-A14). These seals are associated with the upper containment personnel access hatches.

3.21.2 Purpose

To evaluate the containment access hatches (penetration Nos. A12734N022 and A14734S010) located on the 734' elevation of the Auxiliary Building. The access hatches are located in the Reactor Building access rooms 734-12 (Unit 1), fire area FAA-076 and 734-14 (Unit 2) fire area FAA-078. The

access hatches pass through the 3-hour fire rated barrier separating the Reactor Building access rooms and their respective containment building and annulus. The ability of the barrier to prevent the passage of flames, water, and hot gases, considering the fire hazards of the associated areas will be examined.

3.22.3 Evaluation

Penetration Nos. A12734N022 and A14734S010 are associated with the Unit 1 and Unit 2 containment access hatches, respectively. These hatches are located in the Reactor Building access rooms on the 734' elevation of the Auxiliary Building. The access hatches are of the same configuration and are used for personnel access into the upper levels of the containment buildings. Due to their unique configuration, the access hatches are not a tested configuration and there are no existing SQN typical penetration/seal details which cover this configuration.

Each penetration consists of a large corebore (110" diameter) with a 102" diameter cylindrical steel "tube" assembly passing through the center. A steel plate is welded on each end of the "tube" assembly. Several items penetrate the steel plate including pipes, plugs, door handles and an access door. There is nominal 4" annular space between the tube and the corebore wall. The annular space is seal with rubber boot assemblies recessed approximately 32" into the concrete barriers from the access rooms. Each steel hatch assembly passes through the 3'-0" shield building wall, continues through the annulus area penetrating the containment vessel, and opens on the inside of the containment vessel. The penetration created through the containment vessel is not a concern due to the annulus and inside portion of containment are the same fire areas.

The combustible loading of the Unit 1 and Unit 2 Reactor Building access rooms (fire area FAA-076) is low. The combustible loads of these rooms consist primarily of cable insulation located in cable trays. The cable trays are located through the areas at elevations above the access hatch assemblies. The rooms/areas are protected by automatic pre-action suppression systems and automatic ionization smoke detection. Upon actuation, the detection system alarms in the control room and activates the automatic suppression system. Upon receipt of detection alarm in the control room, fire brigade response is expected to ensure the fire is extinguished.

3.22.4 Summary

Although the access hatch configurations are not directly supported by 3-hour fire testing, their substantial construction of steel, use of a boot to seal the annular space, presence of suppression and detection, location and type of adjacent combustible materials, and postulated fire scenarios support the existing access hatches to be adequate for the fire hazards present. Additionally, a fire occurring on either side of the access hatches will not challenge the ability of the overall configuration to function as required in preventing the propagation of fire from one fire area to another.

3.23 Analysis of Penetration Located Between Rooms 669.0-A1 and 669.0-A31, SQN-26-D054/EPM-VTI-013095, R0

3.23.1 Statement of Problem

An untested penetration seal configuration is located between rooms 669-A01 and 669-A31. This seal is associated with the fire door assembly located within the barrier.

3.23.2 Purpose

To evaluate a non-qualified penetration located in the fire barrier separating rooms 669-A01 and 669-A31 (penetration Nos. A01669W209 and A31669E025). The ability of the penetration to prevent the passage of flames, water and hot gases considering the fire hazards of the associated areas will be examined.

3.23.3 Evaluation

Penetration No. A01669W209 consists of a 5/8" diameter tube embedded in the concrete and extending 1' beyond the barrier. A 1/4" chain passes through the tube and is related to the operation of fire door A51a. No seal material is present inside the tube.

Penetration No. A31669E025 consists of a 1/2" diameter tube embedded in the concrete and extending slightly beyond the barrier. A fusible link assembly is located at the opening of the tube with a chain passing through the tube. The configuration is related to the operation of fire door A51a. No seal material is present inside the tube.

The combustible loading of the corridor (669-A01) is moderate and the total combustible loading for fire area FAA-001 is low. These combustible loads are due primarily to cable insulation, plastics, oil and grease. The majority of the loading for fire area FAA-001 is located in the 669' corridor which results in the higher loading value. For this reason, this evaluation is based on the moderate combustible load of the corridor. The nearest combustible materials to penetration A01669W209 are cable trays located overhead. The corridor is protected by automatic pre-action sprinklers and automatic ionization smoke detection. Upon actuation, the detection system alarms in the control room and activates the automatic suppression system. Upon receipt of detection alarm in the control room, fire brigade response is expected to ensure the fire is extinguished.

The combustible loading of the old hot tool room (fire area FAA-028) is low resulting in a fire severity of less than 60 minutes. This room is used for storage of equipment and materials to support modification and radiological control work activities. The materials stored in this room are considered to be transient combustibles and are controlled by administrative procedures. The transient combustibles identified during walkdowns include various class A combustibles such as plastic, cloth, and flammable liquids. All flammable liquids are stored in accordance with NFPA 30, "Flammable and Combustible Liquids Code." This room contains no automatic suppression or detection systems.

Using a conservative assumption that the closest cabling to the barrier is safe shutdown related, there are no intervening insitu combustibles between the penetration and the safe shutdown components located in fire areas FAA-001 and FAA-028.

3.23.4 Summary

Based on factors such as small opening size, fire protection features (automatic suppression and detection) and configuration of combustibles, propagation of fire through the penetration (A01669W209 and A31669E025) is not a creditable event. No further action is required.

3.24 Analysis of Embedded and Inaccessible Penetrations, SQN-26-D054/EPM-VTI-013195, R0

3.24.1 Statement of Problem

During penetration seal walkdowns, embedded penetrations and penetrations which had inaccessible opposite sides were found. Since information is required from both sides to adequately evaluate a seal, this calculation is being performed to justify the existing penetrations without information from the opposite side.

3.24.2 Purpose

To evaluate penetrations located in fire barriers which have no opposite penetration number assigned. The lack of an opposite side penetration prohibits the assignment of a typical seal detail since information necessary for evaluation is only available for one side of the penetration. The ability of these penetrations to prevent the propagation of fire, considering fire hazards of associated areas, conservative design configurations and overall acceptability of SQN penetration seal program has been examined.

3.24.3 Evaluation

As a result of being embedded in fire barriers, several penetrations have been identified as having no opposite penetration. Embedded penetrations do not exit the barrier on the direct opposite side. These penetrations may exit at another location in the plant, or have no exit point. For the purpose of conservatism; this analysis is directed towards penetrations which do not have an opposite side identified in the plant. Additionally, conduits are not included in the embedded penetrations. These have been previously identified and are considered to be adequately sealed internally. The embedded penetrations do contain seal materials and the penetrations, based on non-destructive examination, are acceptable. Embedded penetrations contain seal materials and any penetrations which appear have been identified and resolved. A fire which may impact an embedded penetration would first have to degrade the existing seal prior to any propagation of fire through the penetration.

Due to the presence of an opposite side, a potential for the propagation of flames, hot gases and water exists. However, since the opposite side is not directly opposite the penetration, a tortuous propagation path exists which reduces the ability for flames, hot gases or water to pass through the penetration. Since conduits are not being included in this analysis, the presence of combustible materials which could propagate fire through the penetration is not a creditable situation. Since the penetration is embedded and does not pass straight through the barrier, a greater surface area of concrete is available to absorb heat. Therefore significant transmission of heat through the penetration is not considered to be a likely event.

When penetrations have an opposite side in the plant, a penetration seal is present at the opposite side. Any non-qualified penetration seal or penetration seals which appear to be damaged have been addressed and resolved. The presence of a penetration seal on the opposite side will further prevent the passage of flames, hot gases and water which may reach the opposite side.

The above information shows that the spread of flames, hot gases or water through embedded penetrations is not a creditable event. This is based on the conservative design of embedded penetrations in that they contain no combustible materials, have a greater amount of concrete to absorb heat, and have seals installed at the barrier surface.

Several penetrations have been identified which have an opposite side that was inaccessible at the time of walkdowns. The inaccessibility is a result of rooms being high radiation or restricted access, or where the opposite side of a penetration terminates into a known piece of plant equipment. With over 49,000 penetration numbers currently assigned, an extremely small percentage of the total population of penetration

seals have inaccessible opposite sides and cannot have a typical detail assigned. An analysis was necessary to determine the adequacy of penetrations which were inspected from only one side due to accessibility.

Based on non-destructive examinations, penetrations inspected from only one side have an acceptable penetration seal installed. During plant walkdowns and subsequent review to assign typical details, any penetrations which appeared to be damaged or inadequate were identified and resolved. The presence of an adequate penetration seal from the accessible side is a strong indicator that the overall seal assembly is acceptable. This is also evidenced by the overall penetration sealing which was observed during plant walkdowns. No generic penetration seal configurations were discovered that are not qualified as fire rated seals. Additionally, no conduits are included in these penetrations since all conduits have been identified and are considered to be adequately sealed internally. This eliminates the potential for combustible materials, which may propagate fire through the penetration, to be present within the penetration.

Combustible loading of inaccessible rooms is considered low and typically the result of a radiation control step-off pad which is present in the room. The low combustible loading, along with the configuration of the combustibles within the room significantly reduces the potential for a fire which may impact the penetration seal which is in place.

Penetrations which are inaccessible on the opposite side because they terminate into plant equipment, such as transformers, are all located in floor/ceiling barriers, with the equipment being located on the top side of the barrier. Based upon non-destructive examination the bottom side of the penetration is adequately sealed. Since the most severe fire exposure would be from the bottom side, the seal in place is expected to prevent the propagation of fire through the penetration. A fire originating on the top side of the barrier is not expected to propagate downward through the penetration, considering that the penetration terminates into plant equipment.

Based on the discussions above regarding the existence of an acceptable seal on one side of the penetration, low combustible loads on the opposite side and overall acceptability of SQN penetration seals, the penetrations which can only be inspected from one side due to accessibility are considered to be acceptable.

3.24.4 Summary

The discussion relative to embedded penetrations demonstrates that an embedded penetration provides a tortuous propagation path and inhibits the propagation of fire through the penetration. Therefore, provided an acceptable seal exists (based on non-destructive examination), the presence of embedded penetrations is acceptable.

Also, the discussion relative to penetrations in which the opposite side is inaccessible identifies that acceptable seals (based on non-destructive examination) are present on the accessible side of the barrier, and that the inaccessible sides are located in rooms/areas which contain low combustible loading. Likewise, no combustible material is present in the penetrations which might aid the propagation of fire from one side of the barrier to the other. Therefore, the inspection of only one side of a penetration when the opposite side is inaccessible is considered acceptable.

3.25 Analysis of Remaining Auxiliary Building and Control Building Fire Dampers, SQN-26-D053/EPM-VTI-082895, R0

3.25.1 Statement of Problem

Sixty-one fire dampers in rated fire barriers must be evaluated due to non-manufacturer approved installation methods. NRC Generic Letter 86-10 type evaluations are required.

3.25.2 Purpose

The purpose of this evaluation was to determine whether the remaining fire dampers located in the Control and Auxiliary Buildings, are acceptable as is or require modification or replacement. The ability of, or requirement for, each damper configuration to be the sole item protecting its respective barrier opening was examined.

3.25.3 Evaluation

For each damper, it can be demonstrated that mitigating features exist which will decrease the severity of the fire to which the damper could potentially be exposed. These mitigating features may include installed ductwork on one or both sides of the damper, automatic suppression systems, automatic detection systems, low combustible loading, and prompt response of the trained fire brigade. In all cases, protection of the opening commensurate with the fire hazards of the associated areas can be demonstrated. Because Appendix R requirements are prescriptive rather than performance based, it is acceptable for rooms to have a greater fire load (duration) than fire barrier rating. This is a documented condition for several rooms in the referenced SQN Fire Hazards Analysis (FHA) calculation. SQN's "Defense-in-Depth" fire protection program serves to compensate for this fire durations. (Defense-in-Depth addresses preventing fires from starting, detecting and extinguishing fires that occur, compartmentation through fire cell design within a fire area to limit fire development through construction techniques, and the control of smoke and toxic fire gases.) The FHA fire durations are worst case because all combustible materials are considered to have complete combustion and quantities are maximized (i.e., cable trays are considered 100% filled even if they only contain a few cables.)

3.25.4 Summary

With each damper in its current configuration, existing Appendix R compliance strategies for the affected rooms and/or fire areas are not adversely affected. The intent of the separation requirements of 10CFR50, Appendix R, Section III.G are maintained, and the ability of the plant to achieve safe shutdown is not compromised.

3.26 Analysis of Detection and Suppression Capability in the Control Building Corridor 669.0-C11, Safety Analysis and Safety Evaluation, Request for SAR Change - Section 9.5.1, R0 (Change No. 11-23)

3.26.1 Statement of Problem

Apparent discrepancies exist between Safety Analysis Report (SAR) Section 9.5.1.1.g., documents referenced in SAR Section 9.5.1.3, Technical Specification 3.7.11.2.c., NFPA 13, and the SQN FHA calculation SQN-26-D054/EPM-ABB-IMPFHA.

3.26.2 Purpose

Resolve discrepancies that exist between the documents listed as to lack of automatic (preaction) actuation of the Control Building corridor 669.0-C11 sprinklers.

3.26.3 Evaluation

One of the documents referenced in SAR Section 9.5.1.3 is the October 23, 1979, letter from L. M. Mills to L. S. Rubenstein. This letter encloses Revision 4 of TVA's response to the NRC ASB fire protection review questions for SQN Nuclear Plant. In the response, the Control Building corridor 669.0-C11 is listed in Table 1-1 as being protected by a "pre-action sprinkler system." Because the referenced document in the SAR is a memorandum, the document itself cannot be revised. The Request for SAR Change adds a note to Section 9.5.1.3 stating that information contained in these references may not reflect the as-configured condition of the plant. A review of design output documentation confirms that zone 48 and 49 detectors (shown on 1,2-47W611-13-2) for the corridor are not configured to provide for automatic actuation of flow control valves 0-FCV-26-203 and 0-FCV-26-207 (shown on 1,2-47W850-9) which supply water to the sprinkler heads in the corridor. These twoFCVs also provide water for other designated rooms on 669.0. Give the very low fire load (5 minutes), lack of ignition sources, and lack of fire spread, there is no reasonable possibility of a fire that could damage any equipment (conduit or cables) important to the safety of the plant. It is very likely that the fire brigade member responding to an alarm would use a portable extinguisher or hose station to extinguish a fire prior to manually actuating theFCVs. Because of the very low fire load, a significant possibility exists that sprinkler heads would not fuse prior to self-extinguishment or extinguishment by other means. For the reasons stated above, the "manual" actuation of thesFCVs are acceptable for the hazards they protect. The Request for SAR change adds a statement to SAR Section 9.5.1.1.g which provides for actuation of manual actuation of control valves where required. It has been demonstrated that the safety related cables contained in conduit would not be affected by the very low fire load in the corridor and that the as-configured corridor suppression system is operable based on fast fire brigade response and the ability to manually activate theFCVs. For these reasons, the system is acceptable and there are no changes required to the T/S.

3.26.4 Summary

It has been shown that the as-configured detection/suppression for the Control Building corridor 669.0-C11 is acceptable for the equipment protected. The system is acceptable as a manually initiated system and does not involve anunreviewed safety question. This change does not adversely affect any safety limits, settings, or limiting conditions of operation. There are no Technical Specification changes. SAR Change No. 11-23 has been incorporated into the SAR.

3.27 Analysis of Detection in the Control Building Corridor 685.0-C2, Safety Analysis And Safety Evaluation, SQ940549PER, R0

3.27.1 Statement of Problem

Apparent discrepancy in SAR Section 9.5.1.1 which states "Provide an early warning fire detection system to notify personnel of a fire, actuate automatic suppression systems and control auxiliary equipment." Control Building computer room corridor 685.0-C2 does not have fire detectors installed below the

suspended ceiling and therefore does not meet the above statement of the SAR.

3.27.2 Purpose

To support the as-configured design of the 685.0-C2 corridor detection system without detection below suspended ceiling

3.27.3 Evaluation

There are detectors in this corridor above the suspended ceiling. However, there are no detectors below the ceiling. All areas of Control Building 685' are considered safety-related areas. However, there is no safety-related equipment in the corridor of elevation 685' in the Control Building. The only equipment in the corridor is cable trays above the suspended ceiling which are protected by fire detectors and some instrument shop storage cabinets on the floor which present a minimal fire load. All combustibles within the corridor are stored in these metal cabinets. They are required to be locked or secured at all times and there are no ignition sources in the area. These cabinets are included in the FHA which documents a fire load of 0.71 hours in a 1.5 hour rated area. Also there is a 3-hour wall that separates the Control Building from the Auxiliary Building ensures that the alternative safe shutdown capability, which is located in the Auxiliary Building will not be damaged by a fire in the Control Building. Also, this corridor is a high traffic area and a fire in this area would probably be discovered during its incipient stage. Another factor is the availability of manually-operated equipment from fire hose stations and portable extinguishers nearby. For these reasons, no additional detection is required below the suspended ceiling in Control Building corridor 685.0-C2.

3.27.4 Summary

The configuration of the detectors in the Control Building corridor, room 685.0-C2, does not introduce any new creditable failure modes, does not adversely affect the operation of any safety-related structures, systems, or components, there are no design basis accidents affected by this configuration, or adverse affect on safe shutdown capability.

3.28 Analysis of Numerous Fire Barrier Changes/Clarifications for the FHA and Compartmentation Drawings and other Misc. Evaluations itemized below (Reference the GL 86-10 evaluation in the Safety Assessment/Evaluation of DCN S11786A)

3.28.1 The barrier designations for specific portions of exterior walls of the Auxiliary, Control, and Reactor Buildings are being changed to indicate these are not required to be fire rated barriers (Ref DCN S11786A, 1,2-47W494-series).

Exterior wall sections of the Auxiliary, Control, and Reactor Buildings which do not separate shutdown-related division(s) inside the plant from redundant counterparts outside the plant in the immediate vicinity of an exterior wall or which are against grade are not required to be fire rated. Fire loads are not present in the immediate vicinity of the exterior walls to pose a significant fire threat to safety-related features within the buildings. These fire loads are controlled by SSP-12.15. Fire loads in the vicinity of these non-fire-rated exterior barriers will be evaluated with respect to threats to plant features within these buildings.

These barriers are not specifically delineated as fire rated in the FSAR text or figures, and the FHA calculation (SQN-26-DO54/EPM-ABB-IMPFHA), which is referenced in the FSAR, is being revised to

reflect that these barriers are non-fire-rated. This clarification of exterior wall Fire Barrier requirements does not affect the minimum 3-hour fire resistive rating assigned to the construction between the Reactor and Auxiliary Buildings, the Control and Auxiliary Buildings, the Service and Auxiliary Buildings, or the Control and Turbine Buildings which conform to BTP-9.5.1 Appendix A guidelines. Therefore, these barrier changes do not result in an increased threat to safety-related features and is consistent with Appendix R separation requirements in GL 86-10 and its enclosures, and are acceptable from a nuclear safety standpoint.

3.28.2 **The Spreading room (706.0-C2) and the Instrument Shop (706.0-C3) are being combined in the same Fire Area as the Mechanical Equipment Room (732.0-C1), Corridor (732.0-C3), Main Control Room (732.0-C12), and the Corridor (732.0-C15), thereby derating portions of the Control Building El 732.0 floor as an approved 3 hr barrier (Ref. DCN S11786A, SQ950356PER).**

Within the Control Building Interior, the Spreading room (706.0-C2) and the Instrument Shop (706.0-C3) are being combined in the same Fire Area (FAC-017) as the Mechanical Equipment Room (732.0-C1), Corridor (732.0-C3), Main Control Room (732.0-C12), and the Corridor (732.0-C15). This is required because the Main Control Room floor seals under electrical cabinets have not been qualified as 3 hr fire rated (Ref. SQ950356PER). Combination of these Control Building rooms into a single fire area is acceptable due to the following considerations which have been previously delineated in an NRC safety evaluation for Control Building fire protection acceptability:

- ⇒ Availability of the alternative shutdown capability to assure plant shutdown via the shutdown panel in the Auxiliary Building. It is recognized that a significant fire in the Spreading Room would likely require abandonment of the Main Control Room to the Auxiliary Building Auxiliary Control Room because of damage to control cables. The entire Control Building could be lost in a fire, and the ability to achieve safe shutdown would be maintained in the Auxiliary Control Room.
- ⇒ A three hour rated fire barrier provided between the Control and Auxiliary Building (The location of the alternate shutdown facilities).
- ⇒ Complete fire detection coverage, except for stairs.
- ⇒ Fixed fire suppression systems for fire zones having appreciable combustible fuel loads.
- ⇒ Availability of interior fire hose and standpipe systems, and portable fire extinguishes.
- ⇒ Prompt response by the plant fire brigade.
- ⇒ A continuously occupied Main Control Room.
- ⇒ Significant fire stop capabilities of the barrier (732 floor between C3 & C11) with hot gas, toxic gas and smoke barrier capabilities (Ref. Note 3 on 47W494-7). Appropriate maintenance of the floor seals and breaching permits are still required.
- ⇒ Adequate time for operations to shift plant control from the MCR to the Auxiliary Building Auxiliary Control Room.

These considerations are not significantly affected by the combination of these rooms into a single fire area and therefore justify the continued acceptability of the Control Building fire protection features for this change.

This change does not impact previously approved Appendix R deviation #1 which takes credit for low fire loads in the MCR. The barrier remains a significant fire stop and will be maintained as such by the addition of Note 3 on 47W494-7. Therefore this change does not significantly increase the existing fire load in the MCR, and does not decrease nuclear safety.

3.28.3 **The structure between the Fuel Transfer Canal on the Auxiliary Building Refuel floor and the Reactor Building Keyway is identified as an equivalent 3 hour fire barrier, including the Fuel Transfer Tube (Reference DCNS11786A, SQ960854PER).**

The barrier separating the Auxiliary Building from the Reactor Buildings is required to be 3 hr. fire rated to satisfy Appendix A to BTP-9.5-1 commitments. The Fuel Transfer Canal in the Auxiliary Building is separated from the Keyway area of each Reactor Building by a Fuel Transfer Tube, which is not a fire tested configuration. This configuration consists of a mostly embedded ~20 ft. long stainless steel 20" OD x 0.375" wall steel tube sealed at the Reactor Building end by a 150# blind flange and a gate valve on the Transfer Canal end. It is an engineered piece of equipment with penetration sleeves, bellows, etc. (ref. drawings 1 & 2-47W455-1 and 48N1243). This arrangement provides an acceptable fire rated barrier for the following reasons:

- ⇒ There are no FSSD equipment in the immediate area at either end of the Fuel Transfer Tube.
- ⇒ There are no ignition sources or significant permanent combustible fuel loads in the vicinity of either end of the Fuel Transfer Tube at the bottom of the Fuel Transfer Canal or the Reactor Building Keyway area. These areas are very large and open.
- ⇒ Transient combustibles are controlled by SSP-12.15, hand held items by SSP-12.7, and the Foreign Materials Exclusion program for periods when these areas are not flooded with refueling water, which should preclude significant combustibles in these areas.
- ⇒ The length of the Transfer Tube (approximately 20 ft.) is such that a credible fire would not have a significant effect at the opposing end of the Tube, nor provide a significant level of heat transfer to compromise the barrier or equipment.
- ⇒ The transfer tube in the annulus is covered by concrete blocks for shielding, further enhancing it's fire resistance (Reference SQ960854PER).
- ⇒ When the blind flange is removed, the canal & fuel transfer tube is then flooded with water to provide an environment where fire is not credible.

3.28.4 **There is an equipment hatch in the ceiling of the Control Building Mechanical Equipment Room (669.0-C01) which is common to the Turbine Building elevation 685.0 that is evaluated as an equivalent fire barrier (DCN S11786A).**

There is an unprotected equipment hatch (. 8' x 14') in the ceiling of the Control Building Mechanical Equipment Room (669.0-C01) which is common to the Turbine Building elevation 685.0 The substantial hatch cover is comprised of 3 sections primarily constructed of structural steel main beams (4x2" Bar with two L22x22x2" welded to form a beam) with a 2" steel skin plate. It is bolted to the floor and each other with corrosion resistant 2" steel screws and has a gasket seal (Ref. Dwg 48N1284). This hatch cover provides an acceptable fire rated barrier for the following reasons:

- ⇒ There are no ignition sources or significant permanent combustible fuel loads in the vicinity of the hatch in the Turbine Building which could sustain a fire.
- ⇒ Present FHA analysis results show only a small quantity of combustibles in the Control Building Mechanical Equipment Room which correlates to a fire duration of less than 10 min. This duration is insignificant with respect to the heavy construction of the hatch cover, and even less significant considering the identified fire loads for the room are not directly below the hatch.
- ⇒ No redundant FSSD components are located in the vicinity of the hatch in the Turbine Building and therefore a fire in the Control Building Mechanical Equipment Room below cannot damage other FSSD components if the hatch cover barrier is compromised.

⇒ Transient combustibles are controlled by SSP-12.15 which should preclude significant unattended combustibles in the immediate vicinity of the hatch.
⇒ The Auxiliary Building and Turbine Building are separated by 3 hr fire rated barriers.
⇒ Shutdown capabilities exist in the Auxiliary Building independent of the Control Building.
⇒ Detection and suppression in the Turbine and Control Buildings, along with fire brigade response subsequent to detection, provide assurance that any fire would be extinguished before structural damage to the hatch could occur.

3.28.5 Drop-out panels on elevation 653.0 to the passive sump are shown as barrier openings which are evaluated as acceptable (DCN S11786A).

Drop-out panels in the Auxiliary Building on elevation 653.0 leading to the passive sump are shown as barrier openings. These drop-out panels exist in the RHR pump rooms, CS pump rooms, and the 653.0 pipe chases and actuate for a line break or flood in any compartment to allow the water to enter the passive sump. These panels are acceptable because of their steel construction and there are no FSSD equipment, significant combustibles or ignition sources in the passive sump. The separation between rooms on the 653.0 elevation is maintained due to the lack of combustibles in the passive sump capable of transmitting a fire from beneath the 653 floor to a room above. Similarly, there would be no fire damage to the passive sump from a room above.

3.28.6 The barriers between the 696.0 pipe tunnel (which is part of room 669.0-A15) to rooms 706.0-A3, -A4, & -A5 is indicated as a 3 hr fire barrier on 1,2-47W494-3. The barrier consists of a floor, an unqualified floor hatch (barrier opening), and a pipe tunnel that provide equivalent protection (DCN S11786A).

The Auxiliary Building barrier between the 696.0 spent resin - Waste Packaging Area pipe tunnel (which is part of room 669.0-A15 and FAA-019) to rooms 706.0-A3, -A4, & -A5 (FAA-047) is indicated as a 3 hr fire barrier on 1,2-47W494-3. The barrier consists of a floor and an unqualified floor hatch (barrier opening). While the hatch is unqualified, this barrier is acceptable due to the following considerations:

⇒ There are no FSSD components in either room adjoining the Tunnel.
⇒ There are no significant combustibles or ignition sources adjacent to the tunnel in either FAA-019 or FAA-047.
⇒ The length of the tunnel (>30 ft) and lack of combustible materials within preclude a fire in one area from significantly affecting the other.
⇒ Room 669.0-A15 is a high radiation area thereby limiting access, transient combustibles, and breaches.
⇒ The hatch and floor provide a significant smoke and toxic gas barrier.
⇒ There is detection and automatic suppression in both fire areas.
⇒ Prompt response by the Fire Brigade subsequent to fire detection.

3.28.7 Railroad Bay motorized hatches and vertical door enclosures are designated as barrier openings in the Refueling Floor on 1,2-47W494-4 which are evaluated as acceptable (DCN S11786A).

The Auxiliary Building Railroad Bay motorized hatches and vertical door enclosure are not qualified fire

barriers. However the barrier opening is acceptable due to the following considerations:

⇒ There are no FSSD components in the vicinity of either side of the hatches/enclosure.
⇒ There are no significant combustibles or ignition sources on the Refueling Floor in the vicinity of the hatches.
⇒ The hatches/enclosures are heavy steel construction and are reinforced with structural members and include seals.
⇒ There is fire detection on both sides of the hatch, and water spray around the three accessible sides below the hatch help protect it from fire damage from below.
⇒ Subsequent to detection on either side of the hatch, a fire brigade would be dispatched to quickly extinguish any fire using available hose stations, etc.

3.28.8 The Auxiliary Building elevator enclosure (Columns A8 & T) is indicated as an equivalent 12 hr barrier on applicable 47W494 drawings (DCN S11786A).

The Auxiliary Building elevator enclosure is a concrete wall which is acceptable as a qualified barrier, in addition to the elevator doors. The contract information relative to the fire rating of the elevator doors could not be located. However the elevator enclosure, including the doors, is acceptable as a 12 hr barrier for the following reasons:

⇒ Section 100.1b of ANSI A17.1-1971 require passenger elevator doors to be qualified as a 12 hr fire barrier.
⇒ There are no significant combustibles in the immediate vicinity of the elevator doors to challenge the structural integrity of the heavy industrial elevator doors.
⇒ There are no significant combustibles within the elevator shaft to transmit a fire from one elevation to the next.
⇒ There are no safety related systems or SSD components within the elevator enclosure.
⇒ Detection exists on each elevation. Suppression exists on elevations with significant combustibles.
⇒ Subsequent to detection, a fire brigade would be dispatched to quickly extinguish any fire using available hose stations, etc.

3.28.9 An Appendix A response (BTP 9.5.1) to the NRC has stated that doors C29, C34, C36, and C54 are locked and alarmed in the Control Room and Security System Alarm Station. This is not the current configuration and an evaluation is provided to show that the intent of this response is still met (Reference DCN S11786A, SQ960783PER).

An Appendix A response to the NRC (A27 791023 018) has stated that doors C29, C34, C36, and C54 are locked and alarmed in the Control Room and Security System Alarm Station. This subject is further discussed in SQ960783PER. This is not the current configuration. The doors are security doors but are not locked to prevent ingress or egress. Additionally, the doors are not alarmed in the Main Control Room. However the intent of the stated configuration is met, in that a significant degree of protection exists to maintain the fire doors in the closed position, due to the following considerations:

⇒ The present key-card and recently updated security system have permitted the use of the listed doors for personnel access/egress without degrading the fire barrier. If opened for more time than

is allowed for ingress/egress, or without proper key card use, an alarm is actuated in the continuously manned central alarm station and a security officer is dispatched to investigate, thereby minimizing the time these doors could remain open and unattended.

⇒ The doors are qualified 3 hr fire stops and administratively controlled as fire doors (breaching permits, etc.).

⇒ The doors are provided with automatic closure mechanisms to help assure they remain closed.

⇒ Fire detection and/or automatic suppression exists on both sides of the doors, in addition to prompt fire brigade response in the event of a fire.

⇒ Moderate to heavy traffic area for Turbine/Control Building access/egress.

⇒ The commitments for these doors will be clarified in the Fire Protection Report.

3.28.10 Diesel Generator Building Doors D1, D2, D3, and D4, along with their concrete missile barriers, are designated as equivalent 3 hr fire barriers (DCN S11786A).

Diesel Generator Building Doors D1, D2, D3, and D4, along with their concrete missile barriers, are not qualified fire barriers. These barriers are designated as equivalent 3 hr fire barriers for the following reasons:

⇒ The doors to each generator "cell" are pressure boundary doors with concrete missile barriers placed immediately outside, preventing a fire on the outside from adversely affecting the pressure door. The concrete barriers are .12" thick and, with the exterior walls, provide 3 hr equivalent fire resistance.

⇒ There are no significant combustibles or ignition sources exterior to the subject doors to transmit a fire from one cell to another.

⇒ There is at least 20 feet separation between the door openings between any two cells.

⇒ There is no safety related system or FSSD components exterior to the Diesel Generator Building in the vicinity of the listed doors.

⇒ Fire detection with CO_2 suppression system is present within each DG room.

⇒ Prompt response by the Fire Brigade subsequent to fire detection, utilizing outside fire hydrants, mobile fire apparatus (pumper), and interior hose stations and extinguishes, as required.

⇒ Offsite power is available for a fire at the DGB.

3.28.11 Barrier openings for ventilation are identified in the west wall of ERCW Pumping Station room 720.0-2 and are evaluated as providing equivalent protection (DCN S11786A).

There are two ventilation openings in the exterior west wall of the ERCW Pumping Station room 720.0-2. These openings are acceptable because:

⇒ The openings are to the exterior which is above water and therefore contains no combustibles to transmit fires between train A and B areas of the Station.

⇒ There are no safety related systems or FSSD components near the openings outside of the Station.

⇒ A greater than 20 foot tortuous path exists to prevent a fire from propagating from El 704.0 thru an HVAC duct at the center of the west side of the Station to El 720.0, out of the unprotected opening to the outside, and into the opening of the opposite train's fire area.

⇒ The unprotected openings are in a concrete cubicle and are therefore separated from the Train B pumps via a tortuous path.

⇒ El 720 rooms have relatively small fire loads, not concentrated near the openings.

⇒ Fire detection for each fire area exists above the ERCW pumps, along with manual suppression to

be utilized by a Fire Brigade subsequent to fire detection.

3.28.12 The Tunnel from the Turbine Building to the CCW Intake Pumping Station is evaluated as an equivalent 3 hr fire barrier (See DCN S11786A and Note 8 on 1,2-47W494-1).

The CCW Pumping Station is considered a stand alone fire area separated from other fire areas. The cable tunnel from the Turbine Building to the CCW Intake Pumping Station has penetrations/barriers which are not designated as fire rated, or included in any fire protection inspection/surveillance procedures (identified in Audit SSA9604, Action Item No. SQN-23). The Tunnel and it's barrier is considered an equivalent 3 hr fire barrier due to the following considerations:

⇒ ERCW piping and manually operated valves are the only safety related components within the CCW IPS, and are physically distanced from this tunnel access and are not subject to fire damage. Further, power to the ERCW valves (1 & 2 - FCV-67-22 & -24) located in the CCW IPS is removed to prevent spurious operation.
⇒ Access from the Turbine Building to this tunnel is restricted.
⇒ There are no FSSD components in the Turbine Building in the vicinity of the tunnel.
⇒ The tunnel fire rated door, along with several hose stations and fire detectors help protect the CCW IPS from fire damage.
⇒ The tunnel length provides sufficient time for fire detection and suppression before it could propagate from the Turbine Building to the CCW IPS.

3.28.13 A barrier opening (. 24" drain pipe) exists in the west wall of the Diesel Generator Building from the building sump enclosure to the yard (DCN S11786A).

The barrier opening from the Diesel Generator Building corridor sump enclosure below El 722.0 thru a pipe to the yard west of the building is equivalent to a 3 hr barrier due to the following considerations:

⇒ No FSSD components exist near the pipe opening in the yard.
⇒ The pipe is buried below grade in the yard with security bars to prevent access at it's discharge in the yard.
⇒ The pipe is greater than 20 feet in length with no significant combustibles or ignition sources at either end.
⇒ The Train A and B DG components within the DGB are separated by at least 20 feet and are protected by detection and suppression.
⇒ Offsite power is available for a fire at the DGB.

3.28.14 Audit item SQN-17 of NA&L Audit SSA9604 identified sliding fire doors in the Diesel Generator Building (D7a & D8a) and the Control Building (C29a, C34a, C36a & C54a) that have only one fusible link instead of three as required by NFPA-80 (DCN S11786A).

Audit item SQN-17 of NA&L Audit SSA9604 identified sliding fire doors in the Diesel Generator Building (D7a & D8a) and the Control Building (C29a, C34a, C36a & C54a) that have only one fusible link instead of three as required by NFPA-80.

The three links required by NFPA-80 are designed to provide door closure in the event of a fire on either side of the door, as well as in the threshold of the door.

Sliding Fire Doors D7a and D8a are 3-hour rated and are located within the Diesel Generator Building Lube Oil Storage Room 722.0-2. There are non fire rated hollow metal doors D7 and D8 in series with D7a and D8a respectively. Each door is equipped with a fusible link and CO_2 pressure actuated release in series with door closure upon actuation of either mechanism. This would permit containment of a fire within the room, thus preventing the fire from breaching the fire rated barriers and spreading to another room. A fire from either adjacent room (Pipe gallery and Corridor, Room 722.0-9 and Carbon Dioxide Storage Room 722.0-1) is not likely due to low fire loads and lack of ignition sources and concentrated combustible fire loads. Room 722.0-9 is provided with detection and water suppression, and room 722.0-1 has no permanent fire loading. In the event a fire from room 722.0-1 or 722.0-9 did breach the hollow metal non-fire rated door D7 or D8, heat from the fire, if sufficient, would melt the fusible link causing the fire door to close before significant damage to room 722.0-2 contents is sustained.

During a field inspection it was also noticed that doors D24a, D27a, and D30a have single release electromechanical mechanisms and door D22a has a single release CO_2 mechanism to actuate upon CO_2 actuation. CO_2 actuation is triggered by either heat or smoke in the involved room. This configuration provides the intended level of fire protection separation. CO_2 suppression and isolation is provided for rooms 740.5-4, -7, -10, & -13, Additionally, there are no FSSD components in room 740.5-1. Offsite power is available for fire at the DGB. Therefore Appendix R compliance is unaffected by these doors.

For the Control Building, three hour fire rated Sliding Fire Doors C29a and C34a are installed in the Turbine Building elevation 706.0 at the "n" column line. This three hour fire rated barrier separates the Turbine Building (TB) from the Control Building (CB). Similarly, doors C36a and C54a are installed on elevation 732.0 in the same wall. The doors are installed on the TB side of the barrier and have only one fusible link instead of three as required by NFPA-80. These doors provide adequate protection for the Control Building from a fire in the Turbine Building due to the following considerations:

- ⇒ The companion doors (C29, C34, C36 and C54) for these fire doors are non-fire rated, heavy equipment, pressure confining, normally closed security doors which will provide a significant level of fire protection.
- ⇒ The primary purpose of this fire barrier wall is to protect the CB from a fire in the TB and the fusible link is located in the Turbine building accordingly. There are no FSSD components located in the Turbine Building in the vicinity of these doors which require protection from a fire in the Control Building. In the late 1970's an N line water curtain system was provided for protection of doors C29a, C34a, C36a, and C54a.
- ⇒ In 1988, eight complete wet pipe sprinkler systems were installed in the TB to provide complete area coverage to areas below the TB deck.
- ⇒ The Spreading Room (706.0-C2) is provided with detection and suppression. This will control any fires within the area and prevent any threat to the TB.

The present fusible link configurations are considered acceptable in that significant detection and suppression are provided as noted. However, the NFPA 80 code compliance is not satisfied. SQN-DC-V-7.5 is revised to document an exception to the NFPA 80 Code of Record.

3.28.15 **<u>Audit item SQN-10A of NA&L Audit SSA9604 identified a that wet pipe sprinkler system was installed above rate compensated thermal detectors and fire suppression sprinklers which appears to be in conflict with Section 3-4.1 of NFPA 72E (1974) (DCN S11786A)</u>.**

Audit item SQN-10A of NA&L Audit SSA9604 identified a that wet pipe sprinkler system was installed above rate compensated thermal detectors and fire suppression sprinklers which appears to be in conflict with Section 3-4.1 of NFPA 72E (1974).

Rate compensated thermal detectors and fire suppression sprinklers are installed along the west side of the 3-hour fire rated barrier wall at column "n" separating the Turbine Building (TB) from the Control Building (CB). Three-hour fire rated penetration seals are installed in this wall. The detectors are specifically located below the seals for the sole purpose of detecting a TB fire in the immediate vicinity that would have the potential to damage the seals. Sprinklers are also installed at the wall to suppress these type fires and add additional redundant protection to the seals. Together, this detection and suppression make up a special "Control Building Wall" fire protection system which provides redundant protection with the penetration seals installed in this wall.

Subsequently, in 1988, eight complete wet pipe sprinkler systems were installed in the TB to provide complete area coverage to areas below the TB deck. These systems were designed to detect and suppress TB fires that may be larger in scope, higher in intensity, but farther away, and have less potential to damage the seals due to direct flame impingement effects. There are some cases where heads from the wet pipe system are located very close to the wall sprinkler heads, and might wet the adjacent sprinkler heads, causing them not to operate (cold-solder). The wet pipe system heads provide coverage in this area. The sprinkler heads on the wet pipe system are located within 18 inches of the ceiling and would be expected to operate before the Control Building wall sprinkler heads, as these heads are further from the ceiling. Also, due to their higher elevation, these sprinklers would be expected to cover a greater area of the wall.

Should a large fire occur in this area, the wet pipe systems would be expected to operate first. They may cold-solder some adjacent heads on the wall sprinkler system due to their higher location. Even if they do cold-solder lower heads, the discharged water will provide an adequate water curtain protecting the exposed Control Building wall. This will accomplish the same intended function as the Control Building Wall Sprinkler System but with greater water flow.

Therefore, it can be concluded that the 3-hour fire wall and 3-hour penetration seals equipped with special detector/sprinkler coverage, in concert with the additional area wide wet pipe sprinkler systems installed in the TB, provides a more than adequate level of protection in separating the two fire areas.

3.28.16 Dampers in Non-FSSD barriers that have been identified with deficiencies are designated as acceptable barrier openings (DCN S11786A).

The following dampers have been identified with deficiencies. These dampers are accepted as-is and the penetrations are designated as barrier openings Ref PERSQ930547II).

FAA/Room	FAA/Room	Related Damper
94 / 749.0-A01	100 / 749.0-A08	1-31C-792
95 / 749.0-A02	96 / 749.0-A03	1-31C-800
67 / 734.0-A02	69 / 734.0-A04	1-31C-926

109 / 759.0-A01	110 / 759.0-A02	1-31C-1200
102 / 749.0-A09	108 / 749.0-A16	2-31C-818
81 / 734.0-A24	86 / 734.0-A22	2-31C-926
111 / 759.0-A03	112 / 759.0-A04	2-31C-1335

These barrier openings are acceptable for the reasons listed below:

- ⇒ The barriers provide sufficient separation between fire areas listed with the limited size openings.
- ⇒ The barriers involved are designated as Non-FSSD and therefore are not required to separate Appendix R equipment.
- ⇒ Detection and suppression is provided in all involved rooms.
- ⇒ Hose stations are available for quick response by the Fire Brigade.

Therefore, no credit is taken for the damper and the NON-FSSD barriers are acceptable with these limited size barrier openings.

3.28.17 The RB Equipment Hatch blast doors are designated as equivalent 3 hr fire barriers (DCN S11786A).

The RB Equipment Hatch blast doors are designated as equivalent 3 hr fire barriers separating the RB Annulus from the Equipment Hatch Rooms (734.0-A11 and A15). These doors provide acceptable fire stop capabilities for the following reasons:

- ⇒ The Equipment Hatch Blast doors are heavy steel, beam reinforced, construction with heavy duty dogging latches all around each leaf. This configuration provides significant fire, smoke, and gas stop capabilities.
- ⇒ The Equipment Hatches, which are a part of the Steel Containment Vessel (SCV), are radiant energy shields which separate Containment from the Annulus. These hatches are heavy steel construction and are attached to the SCV with heavy duty bolting. This configuration provides significant fire, smoke, and gas stop capabilities.
- ⇒ No significant concentrated combustibles are in the vicinity of the SCV Equipment Hatches or Blast Doors in upper Containment, or the Equipment Hatch Rooms.
- ⇒ The Annulus is equipped with detection, Auto Preaction suppression, and hose stations for manual response by the Fire Brigade.
- ⇒ The Unit 2 Equipment Hatch Room (734.0-A15) contains no FSSD SSC's and the Unit 1 Equipment Hatch Room contain only 3 FSSD cables of one redundant path (Two PZR Train A heater cables and one Source Range Channel 1 Neutron Monitoring cable). Loss of these cables will not impair FSSD.
- ⇒ The Unit 1 & 2 Equipment Hatch Rooms contain fire detection and suppression. These rooms have no access during operation and contain no fixed combustibles.

3.29 Analysis of Cable Tray Through-Penetration Firestop System (DCN S10820B)

3.29.1 Statement of Problem

Determine if elimination of cable tray covers outside the shield wall is allowed based on equivalency evaluation performed in accordance with GL 86-10.

3.29.2 Purpose

Determine if the cable tray through-penetration firestop and pressure seal system installed in accordance with TVA drawings 45W880-262 Detail A26, without cable tray covers is an acceptable fire barrier. The following discussion addresses the impact of removing cable tray covers outside the shield building secondary containment barrier on fire seal adequacy.

3.29.3 Evaluation

The change made under DCN S-10820-A involves revising Detail A26 on CCD No. 1,2-45W880-26 to allow containment cable tray penetrations to be configured with or without tray covers outside the secondary containment barrier. The covers are sheetmetal pieces that are configured to cover the cables and the Flamemastic typically installed in cable tray penetrations. These covers were originally designed as an enhancement to prevent molten material from the ladderback tray above from falling onto the tray below. The covers also served the added function of protecting the Flamemastic from damage. Any damage to the Flamemastic is considered an economic concern since no credit is taken for this material as a fire barrier. The cable tray configuration was submitted to the NRC for review and approval as part of the Revision 4 responses to NRC questions dated October 23, 1979. The deletion of the covers is allowed based on the requirement outlined in NRC Generic Letter 86-10 which allows an equivalency evaluation to be performed. This DCN does not affect the requirements for cable tray covers inside the secondary containment.

Based on the engineering equivalency evaluation performed previously (See Section 3.1 of this Part VII), the cable tray penetration systems will perform their intended design function of preventing fire from spreading to any area outside the immediate fire area. Therefore, the installation of the cable tray covers has been determined to provide negligible benefit in the event of a fire that would jeopardize the integrity of the barrier rating. However, installation of the covers would continue to be an acceptable enhancement, since the covers would limit the spread of fire within the fire zone and would prevent molten debris from falling onto the tray below and possible igniting the tray. However, even this event is within the assumptions for the design basis fire per SQN-DC-V-24.0, Rev 4.

The fire rating of 1,2-25W880-26 Detail A26, a cable tray penetrating a floor using an embedded sleeve sealed with 10" of silicone foam, is justified by comparison with configurations fire tested in Progressive Materials and Technologies Final Report SWRI CTP1001A, Rev 0, dated July 25, 1980. (blockouts 1 and 2).

Additionally, numerous instances exists where the cable tray penetrations do not have a 1/2" minimum extension beyond the sleeve opening. The sleeve opening will be completely covered using CERA foam board to achieve the required fire rating.

3.29.4 Summary

Based on the comparison of the detail features with the fire test data above, Detail B-26 of 1,2-45W880-26 as revised by DCN S10820B will provide a fire endurance rating equal to or exceeding that of a 3 hour fire rated assembly.

3.30 Evaluation of Various Penetration Seal Configurations Not Bounded by Available Test

Data, SQN-DES1-015.

3.30.1 Statement of Problem

Provide technical justification for penetration seal configurations installed in the plant but not specifically bounded by available fire endurance tests or system description.

3.30.2 Purpose

The purpose of this calculation is to evaluate various as-installed penetration seal configurations in Reference 2.15, which identified approximately 1500 penetrations which were considered to be non-qualified through-penetration firestops at the time of issuance of the letter. This calculation resolves a portion of the remaining seals requiring documented dispositions, as stated in Corporate Commitment Tracking System (CCTS) NCO960080001.

3.30.3 Evaluation

This calculation provides design input for the portion of the penetration seal configurations identified in "Final Penetration Seal Database File and Non-Qualified Seal List" (RIMS B38 940315 800) that were determined to have design parameters which exceeded limitations specified in System Description Document (SDD) N2-302-400, "Penetration Seals".

Penetration seal configurations evaluated in this calculation are:

Attachment A: Oversized blockout penetration seal typical detail C26 in 8" walls.
Attachment B: Penetration seals installed in gypsum board and plaster walls.
Attachment C: Penetrations exceeding maximum size limitations andsealed with threaded plugs.
Attachment D: Blockout penetrations exceed maximum size/area limitations for seal detail installed (Typical seal details 16A and C26).
Attachment E: Penetrations with grout in seal area.
Attachment F: Mechanical penetrations protected with steel plates.
Attachment G: Blockout penetrations exceed maximum size/area limitations for seal detail installed (Typical details 3A and R3S).
Attachment H: Penetration seal typical detail 13-S with multiple penetrants.
Attachment I: Mechanical penetrations sealed with silicone elastomer.
Attachment J: Blockout penetrations protected with steel plates.
Attachment K: Penetrations requiring maintenance work postponed until next scheduled outage.
Attachment L Foam and elastomer seals with fluid filled large bore pipe.
Attachment M Double layered boot seals with penetrants larger than 2".

Evaluations for the above listed penetration seal configurations based on comparisons with tested configurations, fire area suppression/detection availability, combustible loading, etc., determined the configurations as currently found in the plant to be acceptable.

3.30.4 Summary

The evaluations performed in Attachments A through M find the subject penetration seal assemblies to be acceptable as fire-rated penetration seals equal to the rating of the barriers in which they

were installed.

3.31 Fire Ratings of Hollow Core Masonry Walls, SCG1S591.

3.31.1 Statement of Problem

Document the applicable fire rating for the hollow core masonry walls found throughout the plant and in the High Pressure Fire Protection Building.

3.31.2 Purpose

The purpose of this calculation is to document the anticipated fire ratings for masonry walls located through the plant and the High Pressure Fire Protection Building..

3.31.3 Evaluation

The calculation was written in response to Problem Evaluation Report SQ980418PER to address the following condition: "Documentation was not found to support current installation of C-90 concrete block with dimensions consistent with those assumed in calculations to confirm the rating of the three hour fire rated wall in the new pump house. The extent of condition may include one and one half hour eight inch block fire walls installed during construction."

Through the use of ASTM codes and the Standard Building Code, it was determined that the fire ratings for 4 inch block is equivalent to 1 hr., 8 inch block is equivalent to 2 1/2 hrs., and 12 inch block is equivalent to 4 hrs.

3.31.4 Summary

The hollow core masonry walls found at SQN are constructed of either expanded shale or expanded clay aggregate. The applicable fire ratings are listed above. These ratings exceed the requirements of Mechanical Design Standard DS-M17.3.3, "Fire Barrier Standard," and are therefore acceptable.

3.32 Fire Barrier Rating Evaluation for Inaccessible Barriers and Penetration Seals, MDQ0302-980019.

3.32.1 Statement of Problem

Address the acceptability of fire barriers and associated penetration seals for those areas to which access is restricted for inspection of the seal configurations due to either high radiation levels or plant trip hazards.

3.32.2 Purpose

In the 1992-1993 time frame, a vast majority of the fire barriers and fire barrier components relied upon to achieve compartmentation were inspected as part of SQN's continuing effort to improve the FPP. Because of contract limitations associated with the inspection effort, not all fire barriers and fire barrier

components were inspected. Specifically, fire barriers and fire barrier components in areas designated as High Radiation areas and a few other isolated areas deemed sensitive to plant operation were excluded from inspection. For some of these areas, inspection data was collected and evaluated based on information available for one side of the fire barrier/component (See Section 3.24). For other areas, no inspection data could be collected because both sides of the barrier were considered inaccessible. The purpose of this evaluation is to address the acceptability of fire barriers and associated penetrations seals for those areas in which both sides of the barrier were inaccessible.

3.32.3 Evaluation

Despite not being surveyed, the barriers listed in Table 1.0 of the calculation, including any associated penetration seals, are believed to be acceptable based on the following:

- These barriers (including penetration sealing devices) were designed and constructed as fire barriers.
- The original construction and installation of these barriers and penetration seals was performed under a Quality Assurance/Quality Control program.
- Changes to these barriers and penetration seals have been controlled under the modification process.
- Damage to these barriers and penetration seals is unlikely due to restricted access to these areas (i.e., high rad areas controlled by Health Physics and the Control Room Complex overhead areas controlled by the Shift Supervisor).
- The results of surveillances (including the 1992-1993 inspection and subsequent 18 month Technical Specification inspections) of accessible seals, in conjunction with the nonconformance process and trending programs, has not indicated generic problems attributed to seal damage or degradation as a result of normal plant activity.

In addition to the above, the calculation supplies specific justifications based on fire hazards analyses of the subject fire areas to further support the acceptability of the non-surveyed areas. These justifications have been categorized based on the potential fire hazards associated with the areas adjacent to the non-surveyed fire barriers.

Out of all the fire barriers addressed by this evaluation, the two fire barriers with the greatest concentration of penetrations (approximately 52 penetrations each) are the Shield Building walls common to the Pipe Chase Rooms between elevations 690' and 714'. These barriers were determined to be acceptable for the reasons summarized below:

- These barriers (including penetration sealing devices) were designed and constructed as fire barriers.
- All of the penetrations through these barriers are mechanical sleeves 10" in diameter or less, and per a review of the associated Shield Building drawings all sleeves were sealed with qualified fire rated penetration seal details.
- Because there are no electrical penetrations in these barriers, there are no credible combustible pathways for a fire to propagate between adjacent fire areas.
- In the unlikely event of a fire in either Pipe Chase Room, the ***insignificant*** amount of combustibles assures that the fire would lack sufficient intensity and duration to challenge these fire barriers.

- Any fire that may originate in the Shield Building annulus is expected to be rapidly detected, controlled and promptly extinguished as a result of fire detection and suppression features installed within the annulus.

3.32.4 Summary

Based on the discussions provided above, and considering ALARA practices and the consequences of an accidental plant trip, the barriers and associated penetrations identified in this evaluation do not require further inspection. These barriers and associated penetrations were designed and installed using fire rated configurations and access restrictions imposed on these areas limit the potential for seal damage. Additionally, the hazards and fire protection features associated with areas adjacent to these barriers have been reviewed, and it has been determined that the barriers and associated penetration seals are adequate to prevent the spread of fire to adjacent fire areas.

3.33 Fire Barrier Evaluation for ERCW Manhole/Handholes #12, 29, 33, MDQ0317-970007.

3.33.1 Statement of Problem

ERCW Manhole/Handholes #12, 29, and 33 contain cables for redundant trains of equipment necessary for safe shutdown of the plant. Therefore, the barriers separating the cells containing the redundant cables within each manhole/handhole (4 cells / manhole or handhole; 2 cells / train) are required to be 3-hour rated fire barriers. An evaluation using the guidelines specified in NRC Generic Letter 86-10 is required to determine the acceptability of the subject barriers within the manhole/handholes as 3 hour rated fire barriers.

3.33.2 Purpose

The purpose of this calculation is to provide a technical evaluation, utilizing the guidelines specified in USNRC Generic Letter 86-10, for the acceptability of the barriers separating the first and second cells, and the third and fourth cells of ERCW Manhole/Handholes #12, 29, and 33, as 3-hour rated fire barrier assemblies. PER SQ962307PER was initiated after it was discovered that the cables for redundant ERCW trains were routed through the same tunnels, and no previous specifications for cable separation required for Appendix R compliance had been established (i.e. qualification of penetration seals, continuity of fire barriers, etc.).

The missile shields and/or metal coverplates were removed for inspection from the 3 subject access holes as a result of a corrective action for the PER. During this inspection, several features of the barriers were discovered that either require engineering evaluation or field modifications. The topics addressed in this evaluation are: (1) penetration seals; (2) metal plates on top of the cell compartments serving as 3 hour rated fire barriers; (3) existence of 1" diameter holes for venting/testing; and (4) common lines between cell compartments for sump drainage.

The evaluations specified above, along with the necessary minor field modifications/maintenance, provide the basis for the acceptance of the barriers for ERCW Manhole/Handholes #12, 29, and 33 as 3 hour rated fire barrier assemblies.

3.33.3 Evaluation

The standard train configuration for the ERCW cables through the four cells in each subject manhole/handhole from left to right is as follows: 1A-1B-2B-2A. The cells lie in a side-by-side configuration (i.e. approximately the same centerline elevation of each cell), and are separated by either 12" or 9" concrete walls, and sealed on top by a either a ¼" or 1 ½" thick metal plate. Due to the enclosed nature of the cells, the supply of oxygen necessary to fuel a fire is considered low. Also, the in-situ combustible loading in the ERCW tunnels is low to insignificant, consisting of primarily pipe insulation. In general, the inherent design and as-built configuration of the ERCW tunnels and manhole/handholes is such that the potential for ignition and propagation of a fire is extremely low.

The acceptability of the handholes/manholes as 3 hour rated barrier was based on an evaluation of issues regarding the as-built configuration of the barriers. The issues evaluated were the mechanical and electrical penetration seals, metal cover plates over the cells, vent/test holes in the metal plates and/or missile shields, and common sump lines between cells. The penetration seals were determined to the acceptance criteria for 3 hour rated seals based on sealant material and barrier thicknesses. The metal cover plates were determined to provide sufficient barrier thickness and tortuous paths to prevent flame from spreading from cell to cell. Also, the vent/test holes and common sump lines were determined to be insignificant due to spacing and tortuous path characteristics.

3.33.4 Summary

The barriers separating the 1A/1B trains and the 2B/2A trains in ERCW Manhole/Handholes #12, 29, and 33 have been evaluated in the preceding sections for acceptance as 3 hour rated fire barriers in accordance with the guidelines specified in NRC Generic Letter 86-10. The issues discussed in the evaluation included penetration seals, metal cover plates on top of each cell, venting/testing holes in the metal cover plates, and common sump drainage lines. The penetration seals through the barriers and the metal cover plates were determined to be adequate to provide the necessary fire resistance capabilities, and the existence of the vent/test holes and common sump drainage lines were determined to have negligible impact on the integrity of the fire barriers.

4.0 DEVIATIONS TO BTP9.5-1 APPENDIX A

NRC approved deviations (acceptable alternatives) from the guidance of Appendix A to BTP 9.5-1 are identified in this section.

NRC approval of the SQN Fire Protection Program was contained in the Safety Evaluation Report (SER) dated March 1979 (NUREG 0011) and its supplements 1, 2, and 5. Some "acceptable alternatives" were approved in the SER and other changes were made to the fire protection systems at the NRC's request. The SER information is not presented here. On October 23, 1979 TVA submitted its Revision 4 response to twenty-seven (27) review questions that were enclosed in a letter to TVA dated September 1, 1978. A detailed list of references to the Appendix A program is provided in Part I, "Introduction".

The 27 questions were in response to the "Sequoyah Nuclear Plant Fire Protection Program Reevaluation" (FPPR) previously submitted to the NRC on January 24, 1977. (The Revision 0 through Revision 3 responses had been submitted between November 9, 1978 and March 8, 1979.

On February 17, 1981 a new 10CFR50.48 revision and Appendix R became effective. Subsequent to this date, many Appendix A issues were included with Appendix R correspondence.

The BTP 9.5-1 Appendix A information documented in this section is based on the FPPR, applicable Revision 4 responses to the 27 questions, and other documented responses to potential deficiencies or deviations that were previously identified. Refer to Part I for a complete list of Appendix A references.

The following list provides Section Numbers and Topics of each section number. Refer to Part VIII for the text of each Appendix A Guideline requirement. Applicable text to support these evaluations is provided in this section.

Section No.	Topic
4.1	Duct Insulation
4.2	Compartmentation
4.3	Fire Doors
4.4	Fire Dampers
4.5	Electrical Penetration Fire Stops
4.6	Mechanical Penetration Fire Stops
4.7	Water Sprinklers
Section No.	**Topic**
4.8	Hose Stations
4.9	ERCW Pumps and Power Cables

4.10	ERCW Pump House (Pumping Station)
4.11	Hose Houses
4.12	Locked Valves
4.13	Hose Demand

4.1 Duct Insulation

4.1.1 Requirement

Appendix A Guideline D.1.(d)

4.1.2 Evaluation

The duct insulation installed in safety-related plant areas has been tested by Underwriters Laboratories and has a flame spread rating of 25 and smoke developed rating of 50. TVA did not require the manufacturer to label the duct insulation.

4.2 Compartmentation

4.2.1 Requirement

Appendix A Guideline D.1.(j)

4.2.2 Evaluation

Compartmentation will be provided in accordance with the compartmentation drawings. These drawings indicate the boundaries where fire-resistive construction and assemblies will be utilized to maintain the integrity of fire areas and fire zones. Part X, Fire Hazard Analysis (FHA) also defines the fire rated construction.

A minimum three-hour fire resistive rating has been assigned to the construction between the following buildings:

Reactor Building and Auxiliary Building
Control Building and Auxiliary Building
Service Building and Auxiliary Building
Control Building and Turbine Building

The three-hour and 1-1/2-hour fire rated construction consists of reinforced concrete, reinforced concrete block, or metal lathe and plaster. Construction ratings are assigned based on the equivalency to similar construction denoted by Figure 6-7H of the NFPA Fire Protection Handbook and/or Data Sheet 1-21, Table 2, of Factory Mutual Loss Prevention Data for reinforced concrete and reinforced concrete block walls: and Data Sheet 1-21, Table 4, of Factory Mutual Loss Prevention Data for plaster partitions.

A minimum three-hour fire rated coating ofPyrocrete 102 is applied to all exposed structural steel supporting the main control room floor within the cable spreading room. Applications are in accordance with Design D-717 (BOCA RR 73-42-I-C-1-b).

NOTE: The FHA and compartmentation drawings have been revised to clarify various fire rated barriers and provide technical justification for some barrier configurations. See Part X of the FPR.

4.3 Fire Doors

4.3.1 Requirement

Appendix A Guideline D.1.(j)

4.3.2 Evaluation

UL-labeled fire door assemblies are provided in openings in most fire cell and fire area boundaries. The assemblies are tested in accordance with UL Standard 10B and have a fire resistance rating at least equivalent to the designated rating of the boundary. Thenonlabeled boundary doors are listed in Tables VII-1, VII-2, and VII-3. These doors are identified by number on the compartmentation drawings.

Table VII-1 lists Auxiliary Building special purpose doors which are designed to ASME standards and are of heavy welded steel construction. The doors have multiple side hinges and multiple latch points on the sides, top and bottom. TVA has evaluated these doors and determined that they provide an equivalent fire rating commensurate to the fuel loading in the areas or cells they separate.

Table VII-2 lists the security doors in the Main Control Room. The doors are made of bullet-resistant, heavy gauge steel and have not been tested by UL. However, the door manufacturer has certified that the doors are equivalent to UL tested fire doors rated for three hours.

Table VII-3 lists Auxiliary Building fire-rated door assemblies which have been added in fire wall openings.

The fire doors listed in Table VII-4 are alarmed through the security system's primary alarm station and secondary alarm station. Refer to the compartmentation drawings for details showing door numbers and column lines. TVA does not propose to supervise the operation of other fire doors.

Doors separating the control building from the turbine building are normally closed, heavy equipment doors which are operated by card readers.

All of the heavy equipment doors separating the control and turbine buildings are augmented by 3-hour rated sliding fire doors which are held open by fusible links. There is no alarm capability associated with the sliding fire doors.

4.4 Fire Dampers

4.4.1 Requirement

Appendix A Guideline D.1.(j)

4.4.2 Evaluation

Fire dampers or fire doors will be provided in ventilation ducts when the ducts penetrate fire barriers. The fire dampers/doors will have a fire resistance rating equivalent to the designated rating of the installed barrier as identified on the compartmentation drawings.

Fire damper/doors provided after the submission of TVA's Fire Protection Program Reevaluation (forwarded to the NRC by letter from J. E. Gilleland to R. S. Boyd dated January 24, 1977) are UL listed and tested in accordance with UL Standards 10B or 555.

Fire dampers procured and installed prior to the submission of TVA's Fire protection Program Reevaluation are not UL labeled. These dampers are listed in Tables VII-5 and VII-6.

The nonlabeled fire dampers identified in Table VII-5 conform to the standards of the National Fire protection Association that existed when the dampers were procured. These fire dampers have since been certified by the manufacturer to be equivalent to their presently manufactured UL-listed and labeled models. The location of these dampers is shown on flow diagrams 47W866-2, -3, -4, and -11.

The fire dampers identified in Table VII-6 are non-labeled fire dampers procured under identical specifications as the fire dampers in Table VII-5, but provided by a different manufacturer. These fire dampers comply with the 1966-1967 requirements of NFPA No. 90A. A detailed comparison of construction features of these dampers with the certified dampers identified in Table VII-5 is presented in Table VII-7. Construction features such as the frame design, blade dimensions, blade shaft and bearings, linkage, and materials compare favorably. Therefore, TVA feels that the dampers identified in Table VII-6 are adequate in their installed configuration to provide the required compartmentation.

Table VII-8 lists fire dampers which were added in ventilation ducts penetrating fire barriers containing nonrated dampers or no dampers.

As a result of NRC concerns raised during the Sequoyah Nuclear Plant Fire Protection Review Meeting of February 12, 1979, additional fire dampers were installed in ventilation ducts penetrating the Unit 1 Auxiliary Instrument Rooms in the Control Building and the HEPA Filter Plenum Rooms in the Auxiliary Building. (The HEPA Filter Plenum Room 749.0-A8A has been converted to the Fifth Vital Battery and Board Room.)

None of the fire dampers or fire doors have been installed in ventilation ducts in strict compliance with UL 555 or manufacturer's instructions. TVA discussed the installation details for these dampers/doors with the NRC Staff on February 12, 1979. It was agreed that the installation details meet the intent of UL 555 with one exception. TVA has installed two dampers, PCO-39-17A and 0-31A-148, in ventilation ducts immediately below fire rated ceilings. Each damper is enclosed in a 1-1/2-hour fire rated barrier that extends around the ventilation duct to the ceiling.

Refer to Part VII, Section 3.0 for SQN approved deviations of fire dampers in the Auxiliary, Control, and Diesel Generator Buildings.

4.5 Electrical and Mechanical Penetration Fire Stops

4.5.1 Requirement

Appendix A Guideline D.1.(j)

4.5.2 Evaluation

Several NRC Information Notices have raised generic concerns regarding the control and documentation of fire barrier penetration seals. To address these issues, a comprehensive review of the standard mechanical and electrical penetration seal details, supporting fire tests and installed configurations was prepared. The information for the qualification of the penetration seals for the required fire barrier rating is contained in the SQN Penetration Seal System Description Document, N2-302-400. The system description addresses typical mechanical and electrical seal details and provides the necessary evaluations to document the overall acceptability of the details.

4.7 Water Sprinklers

4.7.1 Requirement

Appendix A Guideline E.3.(c)

4.7.2 Evaluation

SQN Fire Protection closed head suppression systems in safety-related areas are seismically qualified, preaction sprinkler systems. They are charged with water only when cross-zoned detectors (smoke and smoke; smoke and thermal) are actuated. Areas provided with cross-zoned smoke and thermal detection that actuate preaction sprinkler systems are identified in Part X. Due to the inherent tendency of smoke detectors to drift toward their alarmsetpoint with time, cross-zoning provides an additional margin of safety against spurious application of water to safety-related equipment. This design philosophy complies with the intent of BTP APCSB 3-1, Sections B.1 and B.3a which require protection of essential systems and components against postulated piping failures in high or moderate energy fluid systems that operate during normal plant conditions.

In general, the cross-zoning technique utilizes two detectors in the same area that a single detector would normally occupy if located in accordance with UL spacing guidelines. Based on this detection zone overlap, TVA is satisfied that preaction valve actuation will be accomplished prior to the fusing of any sprinkler heads.

4.8 Hose Stations

4.8.1 Requirement

E.3.(d)Appendix A Guideline

4.8.2 Evaluation

The standpipe and hose stations at SQN have been designed along the guidelines of NFPA 14 which allows up to 100 feetof hose connected to the standpipe. SQN has also installed 125 foot hose lengths in special areas. All fire hose installations provide adequate flow and pressure and are readily accessible to ensure complete coverage of the affected fire areas. Fire hose locations are approximately located on the 47W200 drawing series.

4.9 ERCW Pumps and Power Cables

4.9.1 Requirement

Appendix A Guidelines D.3.(c) and F.5.

4.9.2 Evaluation

On elevation 690.0 of the Auxiliary Building four power cables (both trains of both units) of the ERCW pump from the yard pump house come into a metal enclosure mounted on the concrete wall approximately 10 ft. above the floor. Each cable within the junction box is separated by a metal baffle. From the enclosure, the Train A cables are run in conduits and go up the wall and through the ceiling.

The conduits ascend from the junction box to elevation 734.0 embedded only as they penetrate floor slabs. On elevation 734.0 the conduits terminate in cable trays that extend to theswitchgear.

In lieu of the 3-hour fire rated barriers, SQN provided a 1" mineral wool barrier between the redundant power cables in the junction box as protection against an electrically initiated fire. The outside of the junction box and the conduits listed are protected by 1-1/2 hour fire-rated barriers. The conduits are protected from the top of the junction box to the ceiling slab above elevation 690.0'.

The Train B circuits were relocated to provide separation. Beginning at the elevation 690 box, they are routed on elevation 690 to their respectiveswitchgear.

SQN provided sprinkler coverage for the area around the component cooling water pumps and the ERCW pump cable junction box.

4.10 ERCW Pump House (Pumping Station)

4.10.1 Requirement

Appendix A Guideline F.11.

4.10.2 Evaluation

Access and entrance into the ERCW pumping station is strictly controlled. Interior doors are not maintained locked and there are no local alarms or annunciation locally or in the MCR.

4.11 Hose Houses

4.11.1 Requirement

Appendix A Guideline E.2.(g)

4.11.2 Evaluation

Mobile apparatus and hose houses are used as required at SQN. Hose houses are maintained in yard areas where access via mobile apparatus may be limited. The mobile apparatus is equipped with hose, nozzles, and other equipment to effectively perform fire fighting activities using fire hydrants located in the yard.

4.12 Locked Valves

4.12.1 Requirement

Appendix A Guideline E.3.(b)

4.12.2 Evaluation

Exterior lockable valves in the high-pressure fire protection system flow path between the fire pumps and various sprinkler/water spray system isolation valves are locked and/or sealed in their proper position. All interior sectionalizing valves are also locked and/or sealed in their proper position. The various isolation valves to the individual sprinkler and water spray systems are not all locked and/or sealed.

SQN opposed locking and/or sealing the individual sprinkler and water spray system isolation valves in the open positions and is in total agreement that it is essential to maintain these valves in their proper position. SQN also recognizes the necessity of prompt isolation in the event of inadvertent system actuation or mechanical damage to minimize water damage. Therefore, the following actions have been taken.

1. All lockable valves between the water supply (fire pumpdischarge) and the individual sprinkler or water spray andsectionizating valves are locked and/or sealed. This includes all yard isolation andsectional valves and all isolation valves to water spray systems which are located in the yard areas (including valves in valve pits). These valves are verified to be in their proper lineup and locked and/or sealed by means of an existing surveillance instruction.

2. All normally open interior sprinkler and water spray system isolation valves are locked and/or sealed in the open position. Surveillance instructions on valve lineup inspections will require that these locked and/or sealed valves be inspected for proper lineup and seal integrity.

3. It is not feasible to lock and/or seal the containment isolation valves in the fire protection systems for the reactor buildings. This would defeat or degrade the capability of these valves to close automatically in the event of containment isolation. Containment isolation is these valves' primary and overriding function, and their location in the flow path to the fire protection systems inside containment is a secondary consideration.

These valves are all located in secured areas with limited access. Administrative controls require these valves be inspected for proper positions and also returned to normal (open) position following phase "A" containment isolation. The combination of administrative controls and the valves' physical location provides adequate assurance of proper valve position.

This proposal is totally consistent with NFPA 26-1976, "Recommended Practices for the Supervision of Valves Controlling Water Supplies for Fire Protection."

4.13 Hose Demand

4.13.1 Requirement

Appendix A Guideline E.2.(e).

4.13.2 Evaluation

In order to meet Appendix R. requirements, SQN significantly increased the coverage of areas required by the plant's high pressure fire protection system. The increased coverage resulted in a higher design point for the system pumps in terms of flow and system head. A hose demand of 250 gpm was included for fire fighting (Reference NRC Safety Evaluation in Tech Spec Change 87-27, RIMs A02 880129 017)

5.0 NFPA CODE DEVIATIONS

The purpose of this section is to document SQN's original NFPA Codes of Record and justifications for any NFPA code deviations that may impact on the operational capabilities of fire protection features. Deviations that do not impact on the operational capabilities of fire protection features are identified in Part VI of the FPR.

5.1 NFPA Codes of Record

Based on the time frame that SQN was being designed and constructed, the following NFPA Codes of Record have been adopted:

NFPA DOCUMENT	YEAR	TITLE	CHAPTERS/ SECTIONS
10	1975	Portable Fire Extinguishers	ALL
11B	1977	Synthetic Foam and Combined Agent Systems	1, 2, 6
12	1973	Carbon Dioxide Extinguishing Systems	1, 2
13	1975	Sprinkler Systems, (Refer to Section 5.1.1 below)	
14	1974	Standpipe and Hose Systems	1 thru 7
15	1973	Water SprayFixed Systems	All
24	1973	Private Fire Service Mains	All
30	1973	Flammable and Combustible Liquids	4, 5
50A	1973	Gaseous Hydrogen Systems	All
72D	1975	Proprietary Protective Signaling Systems	All
72E	1974	Automatic Fire Detectors	All
80	1981	Fire Doors and Windows	All
90A	1975	Air Conditioning and Ventilation Systems	3

194	1974	Fire Hose Connections	All
196	1974	Fire Hose	All

5.1.1 Compliance with NFPA 13-1975 in Regard to the Installation of Sprinkler Systems at Sequoyah Nuclear Plant

NFPA 13-1975 "Standard for the Installation of Sprinkler Systems" is a standard which has been written to provide guidance for the installation of sprinkler systems for a wide range of industrial and commercial properties. NRC also issues guidelines for the provision of fire protection in nuclear power plants. Some portions of NRC guidelines modify the requirements contained in NFPA 13-1975. NRC guidelines take precedence over portions of NFPA 13-1975 when NRC guidelines modify those particular portions of NFPA 13-1975.

Other publications and standards are referenced in NFPA 13-1975. Compliance with the referenced publications and standards is not implied when NFPA 13-1975 is used as a design basis document. Any commitment to comply with a particular publication or standard in whole or in part has been stated as a specific commitment.

Therefore, NFPA 13-1975 is the design basis document for the sprinkler systems at Sequoyah Nuclear Plant except for specific portions which have been modified or deleted in lieu of NRC guidelines or which are not applicable in the nuclear power plant environment, or which have been modified or deleted in lieu of established TVA procedures. The specific portions of NFPA 13-1975 which have been deleted or modified are listed below.

NFPA 13-1975	TVA POSITION
Section 1-5.2 Maintenance	Maintenance and operation of installed systems is performed in accordance with plant operating and maintenance procedures.
Section 1-9 Working Plans	Plans are prepared, reviewed and approved in accordance with TVA design, construction and modification procedures.
Section 1-10 Approval of Sprinkler Systems	Approval of sprinkler systems is performed in accordance with TVA design, construction, and modification procedures.
Section 1-11 Acceptance Tests	System tests are performed in accordance with TVA design, construction and modification procedures.

Section 1-12 Contractor's Material and Test Certificate	Material and test documentation are prepared and maintained in accordance with TVA design, construction and modification procedures.
Section 2-7 Fire Department	Fire department pumper connections are not of significant benefit in a nuclear power plant environment and are not provided.
Section 3-7.3 Provision for Flushing System	Flushing connections are not of significant benefit in a nuclear power plant environment and are not provided. Strainers are provided in the supply to each preaction sprinkler system.
Section 3-9.3 Protection of Piping Against Damage Where Subject to Earthquakes	NRC guidelines and other appropriatestandards for support of piping is used in lieu of the guidelines contained in this section.
Section 3-10.3.4 Auxiliary Drains	Auxiliary drains for trapped sections of pipe are provided but the drains are not installed in the exact configuration specified in section 3-10.3.4. However, the drains, as installed, will perform the required function.
Section 3-11.2 Welded Piping	Installation of welded piping is performed in accordance with TVA design, construction, modification and operational procedures. These procedures allow field welding on sprinkler system installations and modifications. All such welding is controlled by the appropriate safety procedure.
Section 3-12.1.5 Fittings on Risers	Due to other factors affecting the design of sprinkler systems in a nuclear power plant environment, flange joints are not used on the riser at each floor level.

Section 3-12.3
Reducers and Bushings

Prior to the 1987 edition of NFPA 13 Section 3-13.3 "Reducers and Bushings" stated "A one piece reducing fitting shall be used whenever a change is made in the size of the pipe. Exception: Hexagonal or face bushings may be used in reducing the size of openings of fittings when standard fittings of the required size are not available." Between the 1983 and 1987 edition of NFPA-13, the NFPA-13 Technical Committee issued a formal interpretation on this section to clear up industry confusion. The Formal Interpretation was:

Question: Is it the intent of 3-13.3 to exclude the use of bushings when the required fitting is manufactured?

Answer: Yes. The intent is to exclude the use of bushings when the one-piece reducing fitting is available on the market at the time the system is fabricated.

The code of record for SQN sprinkler system is NFPA-13 1975 edition. This was over 10 years prior to the formal interpretation. TVA, like others in the industry, understood the "not available" to mean not available on the shelf or in stock at the time the system was fabricated. As such, hexagon bushings were used. Additionally, under the WBN sprinkler system walkdowns performed in the spring of 1995, TVA reevaluated the use of hexagon bushings. TVA-WBN-1 Fire Sprinkler Walkdown (T51 950406 385) sheet 57 provides a detail discussion of inline bushings. This report concludes: "The bushing losses, therefore, while substantial in themselves, are comparable to other fitting losses and are not excessive relative to the total system hydraulic demand." The report also notes that: "Bushings are a problem due to their tendency to leak. This is addressed by an acceptable hydrostatic test." Post 1987, TVAN has placed restrictions on the use of bushings in sprinkler piping. General Engineering Specification G-73 Rev 4, provides further clarification fir new system fabrication and modifications. Section 4.3.3.1.4 states: "Pipe diameter changes in the sprinkler system shall be made with reducing fittings (reducing ells, tees, and concentric reducers). Hexagon bushings shall be allowed only when a reducing fitting is not commercially manufactured." In conclusion, the use of hexagon bushings in the existing sprinkler systems at SQN is acceptable based on the code of record and accepted industry practices at that time. Modifications and new fabrication are governed by TVA G-73.

Section 3-7.3
Provision for
Flushing System

Flushing connections are not of significant benefit in a nuclear power plant environment and are not provided. Strainers are provided in the supply to each preaction sprinkler system.

Section 3-13.3 Identification of Valves	Valve identification is accomplished in accordance with TVA design, construction, modification, and operational procedure.
Section 3-14 Hangers	NRC guidelines and other appropriate standards are used for support of piping in lieu of the guidelines contained in this section.
Section 3-15.7 Stock of Spare Sprinklers	TVA procedures for the procurement and storageof spare parts are used in lieu of the guidelines set forth in this section.
Section 4-4.8 Elevators, Stairs and Shafts	Only those openings specifically documented in previous commitments to NRC are protected in accordance with the guidelines contained in this section.
Section 5-3 Preaction and Deluge Systems	Manual action is required to initiate fire suppression to the Vital Battery Rooms I, II, III, and IV in lieu of automatic actuation Fire detection and alarm is provided. Refer to section 2.18 of this part for more details.
Section 5-3.5.2 Supervision	Sprinkler piping supervision is not included in the design criteria for all systems with more than 20 sprinklers on the system. The provision of cross-zoned detector logic and pressure switches downstream of each preaction valve is adequate protection against inadvertent application of water from preaction sprinkler systems in areas which do not contain delicate, water-sensitive electrical equipment. This position has been reviewed by NRC-NRR and has been found to be acceptable. The Sequoyah Nuclear Plant Technical Specifications reflect the requirement for six-month testing of detection circuits from the local panel to the actuated devices, i.e., fire dampers, fire door holders, ventilation equipment or preaction valves as agreed in the resolution of open item 7.a during a meeting on February 12, 1979 with NRC-NRR. This commitment is included in Revision 4 of TVA Responses to NRC fire protection questions submitted by letter from L. M. Mills to L. S. Rubenstein dated October 23, 1979. These responses have been reviewed by NRC-NRR and have been found to be acceptable.
Chapter 7 Hydraulically Designed Sprinkler System	TVA design and documentation procedures are used in lieu of the guidelines set forth in this chapter. Any other minor deviation to requirements contained in applicable portions of NFPA 13-1975 which have not been listed above will be analyzed in accordance with 10CFR50.59. Any such deviation which does not adversely affect safety will be documented in accordance with established plant procedures. Corrective action will be initiated for any such deviation which could adversely affect safe operation of the plant.

5.2 Separation Criteria

10CFR50, Appendix R, Section III.G.2 outlines measures that ensure one redundant train will remain free of fire damage. For Section III, G.2.(b), if intervening combustibles are present, then the fire zones shall be protected by a suppression system installed by the following expanded sprinkler system criteria.

ATTACHMENT 1

SPRINKLER SYSTEM CRITERIA FOR RESOLVING INTERVENING COMBUSTIBLE CONCERNS

1.0 OBJECTIVE

The objective of this criteria is to provide compensation for the lack of a horizontal distance of more than 20' free of intervening combustibles between redundant divisions being protected in accordance with 10CFR50 Appendix R, Section III.G.2.b. Compensation is provided by installing, in the defined areas, supplemental sprinkler protection for floor level combustibles when adequate coverage by ceiling level sprinklers is not verified by this criteria.

2.0 AREAS OF CRITERIA APPLICATION

This criteria shall be applied as follows when redundant divisions are separated by horizontal space and more than 20 continuous feet of the space is not free of intervening combustibles.

2.1 If the redundant divisions are greater than 30' apart, the criteria shall be applied to any continuous 30' wide path located between the redundant divisions.

2.2 If the redundant divisions are greater than 20' but less than 30' apart, the criteria shall be applied to the entire horizontal space between divisions.

3.0 ACCEPTANCE CRITERIA FOR EXISTING SPRINKLER HEADS

3.1 Existing sprinkler heads, which have been located to produce fully developed spray patterns at the ceiling, will provide acceptable floor coverage if there are no intermediate obstructions in their patterns which are greater than 48" wide. When individual obstructions overlap or have less than a 4" flue space between them when viewed from immediately below, they shall be considered a single obstruction for determining their cumulative horizontal width. No combination of obstructions may traverse the 4" flue space and block more than 2' of any 8' of flue space.

3.2 Lateral discharge from existing sprinkler heads may be utilized for floor coverage if the portion of their discharge pattern that is being relied on has no significant obstructions. Significance shall be evaluated considering the typical shape of a sprinkler spray pattern and the obstruction guidelines of NFPA13.

3.3 Acceptance of existing heads shall be based on visual observations in the plant.

4.0 CORRECTIVE ACTION

4.1 When Section 3.0 is not satisfied, sprinkler heads shall be provided under the obstructions utilizing one of the following options:

a. Relocate existing heads below intermediate level obstructions if adequate coverage can be maintained at the ceiling level, or;

b. Add new heads below intermediate level obstructions. System adequacy shall be demonstrated using NFPA 13 pipe schedules or hydraulic calculations. If necessary, pipe sizes and supply header arrangements shall be changed to satisfy this requirement.

4.2 The maximum floor area that can be protected by a single sprinkler head shall be 130 ft^2

4.3 When more than one head must be located below obstructions, the distance between heads shall not exceed 15'.

4.4 When hydraulic calculations are used to verify sprinkler system adequacy, the calculations shall be based upon the hydraulically most remote 1500 ft^2 area or the area of the largest room, whichever is smaller. The systems shall be capable of discharging a density of 0.16 gal/min/ft^2 assuming all sprinkler heads in the analyzed area are open.

4.5 If a system designed in accordance with the NFPA 13 pipe schedules supplies sprinkler heads in two or more rooms that are separated by 1-1/2 hour fire-rated construction, the maximum number of heads in each room must satisfy the pipe schedule limits for pipe size with each room considered separately. If this condition is satisfied, the maximum number of heads per pipe size may be exceeded for all the rooms taken together.

TABLE VII-1
Auxiliary Building Special Purpose Doors

DOOR NO.	DOOR TYPE	ELEVATION	COLUMN
A55	Flood door	690.0	s-t, A1
A57	Flood-Pressure	690.0	r-q, A1
A60	Pressure door	690.0	r-s, A1-A2
A64	Pressure door	690.0	u-v, A15-C13
A65	Flood door	690.0	v-w, A1-S1
A77	Pressure door	690.0	u-v, A1-S1
A78	Flood door	690.0	v-w, A15-C-13
A101	Pressure door	706.0	u-v, A2-A3
A105	Pressure door	706.0	u-v, A13-A14
A112	Pressure door	706.0	x-y, A5
A115	Pressure door	706.0	w-x, A6-A8
A123	Pressure door	714.0	t-u, A3
A132	Pressure door	714.0	t-u, A13
A152	Pressure door	734.0	t-u, A5
A153	Pressure door	734.0	t-u, A8
A154	Pressure door	734.0	u-w, A8-A10
A155	Pressure door	734.0	u, A5
A156	Pressure door	734.0	u, A5
A157	Pressure door	734.0	w, A11
A158	Pressure door	734.0	u, A5
A159	Pressure door	734.0	t-u, A11
A173	Pressure door	734.0	u-x, A5-A6
A184	Pressure door	749.0	r-s, A3-A4
A191	Pressure door	749.0	r-s, A12-A13
A214	Pressure door	714.0	w-x, A12-A13
A215	Pressure door	714.0	w-x, A3-A4

TABLE VII-2
Main Control Room Bullet Resistant Security Doors

DOOR NO.	DOOR TYPE	ELEVATION	COLUMN
C49	Security door	732.0	q, C4-C5
C50	Security door	732.0	q, C9-C10

Table VII-3
Added Auxiliary Building Fire Rated Doors

DOOR NO.	ELEVATION	COLUMN	REMARKS (See Note)
A19	669.0	s-t, A6-A8	(1)
A20	669.0	s-t, A5-A6	(1)
A37	669.0	w, A8-A10	(1)
A38	669.0	w,A10-A11	(1)
A82	690.0	q, A4-A5	(1)
A83	690.0	r-s, A3-A4	(1)
A127	714.0	u-v, A6-A8	(1)
A128	714.0	u-v, A8-A10	(1)
A183	714.0	w-x, A3-A4	(2)
A192	714.0	w-x, All-A12	(2)

Notes:

(1) Fire door modifications identified in Nonconformance Report SWP-78-S-2.

(2) Modifications resulting from commitments made in response to question 3.B.(i).

TABLE VII-4
Alarmed Security Doors

DOOR No.	BUILDING	ELEVATION	COLUMN
A140	Auxiliary	734.0	q-r, A6-A8
A172	Auxiliary	734.0	q-r, A8-A10
A203	Auxiliary	759.0	w-x, A4-A5
A204	Auxiliary	759.0	s-t, A11-A12
C23	Control	685.0	n-p, C6-C7
C37	Control	732.0	n-p, C3-C4
C49	Control	732.0	q, C4-C5
C50	Control	732.0	q, C9-C10
C53	Control	732.0	n-p, C10-C11
D15	Diesel	722.0	east wall
D16	Diesel	722.0	east wall
D17	Diesel	722.0	east wall
D18	Diesel	722.0	east wall
D33	Diesel	740.5	south wall
DE3	CDWE	706.0	y, A12

TABLE VII-5
Certified Fire Dampers

TVA DAMPER NO.	TVA DRAWING NO.
0-31A-12	47W866-4
0-31A-20	47W866-4
0-31A-25	47W866-4
0-31A-26	47W866-4
0-31A-8	47W866-4
0-31A-39	47W866-4
0-31A-159	47W866-4
PCO-39-17A	47W866-4
0-31A-13	47W866-4
0-31A-21	47W866-4
1-31C-792	47W866-3
2-31C-818	47W866-3
1-31C-793	47W866-3
1-31C-819	47W866-3
1-31C-796	47W866-3
2-31C-822	47W866-3
1-31C-794	47W866-3
2-31C-820	47W866-3
1-31C-802	47W866-3
2-31C-828	47W866-3
1-31C-829	47W866-3
2-31C-830	47W866-3
1-31C-800	47W866-3
2-31C-826	47W866-3

TABLE VII-5, (continued)
Certified Fire Dampers

TVA DAMPER NO.	TVA DRAWING NO.
1-31C-795	47W866-3
2-31C-821	47W866-3
1-31C-781	47W866-3
2-31C-807	47W866-3
1-31C-1199	47W866-2
2-31C-1333	47W866-11
1-31C-955	47W866-3
2-31C-955	47W866-3
1-31C-777	47W866-3
2-31C-803	47W866-3
1-31C-957	48W866-3
2-31C-957	48W866-3
1-31C-1200	47W866-2
2-31C-1335	47W866-11 (Note 1)

Note 1: See Section 3 of this part for Non-FSSD damper evaluation.

Table VII-6
Equivalent Fire Dampers

TVA DAMPER NO.	TVA DRAWING NO.
1-31C-914	47W866-3
2-31C-914	47W866-3
1-31C-908	47W866-3
1-31C-908	47W866-3
1-31C-926	47W866-3 (Note 1)
2-31C-926	47W866-3 (Note 1)
1-31C-913	47W866-3
2-31C-913	47W866-3
1-31C-906	47W866-3
2-31C-906	47W866-3
1-31C-941	47W866-3
2-31C-941	47W866-3
2-31C-949	47W866-3
1-31C-949	47W866-3
1-31C-935	47W866-3
2-31C-935	47W866-3
1-31C-1204	47W866-2
1-31C-1338	47W866-11
1-31C-1206	47W866-2

Note 1: See Section 3 of this part for Non-FSSD damper evaluation.

TABLE VII-7
Certification/Equivalent Construction Features

Feature	Dowco Corporation and American Foundry and Furnace Co., Model FNM-2003-16 (Non-Labeled)	Ruskin Manufacturing Company Model FD, FD/SS (Certified)
Frame Design	2" x 1/2" x 1/8" HR Steel channel - braced with 1/8" x 1" steel corner brace	3-1/2" x 7/8" x 16ga. (1/16") galvanized with internally braced corners
Blade Dimensions	7" wide maximum, 16ga. galvanized steel	6" wide, 16ga. galvanized steel
Blade Shaft and Bearings	7/16" cadmium steel shaft, oil impregnated bearings	1/2" zinc plated shaft, oilite bronze bearings
Linkage	1/4" diameter cadmium plated CR steel	3/16" x 3/4" steel tiebars
Fusible Link	Yes - 160°	Yes - 160°
Finish	Zincilate-frame mill galvanized	Mill galvanized

TABLE VII-8
Added Fire Dampers in HVAC Ducts

TVA DAMPER NO.	TVA DRAWING NO.
0-31A-243	47W866-4
0-31A-231	47W866-4
0-31A-233	47W866-4
0-31A-241	47W866-4
0-31A-242	47W866-4
0-31A-236	47W866-4
0-31A-257	47W866-4
1-31C-1219	47W866-2
1-31C-1220	47W866-2
1-31C-1217	47W866-2
1-31C-1218	47W866-2
2-31C-1221	47W866-3
2-31C-1222	47W866-3
2-31C-1223	47W866-11
1-31C-611	47W866-8
2-31C-662	47W866-8
0-30-613	47W866-9
0-30-594	47W866-9