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Rev Log	Rev Log
TOC	TOC
Part II Rev 0	PART II Rev 7

TVAN FIRE PROTECTION REPORT APPROVAL PAGE

SEQUOYAH NUCLEAR PLANT
FIRE PROTECTION REPORT

Revision 7

Effective Date: Feb. 1, 2001

Technical Review:	*B.F. Simral (via Curator)* *Site Engineering-Fire Protection*	Date	*12/4/00* *(via Curator)*
Technical Review:	*W.M. Justice (via Curator)* *Site Engineering-Design*	Date	*12/19/00* *(via Curator)*
Technical Review:	*H.R. Rogers (via Curator)* *Site Engineering-System Engineering*	Date	*12/20/00* *(via Curator)*
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PORC Meeting No.:	*5999*	Date	*1/4/01*
Plant Manager:	*D.L Koehl (via Curator)*	Date	*1/29/01* *(via Curator)*

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.	

REVISION LOG

Revision No.	DESCRIPTION OF REVISION	Date Approved
6	Changed required testing frequency for inaccessible detectors from "each COLD SHUTDOWN exceeding 24 hours unless performed in the previous 6 month" to every 18 months during cold shutdowns (page II-42). Related editorial changes to this page, FPR cover sheet, and the table of contents.	10/18/00
7	Changed the compensatory actions for LCO 3.3.3.8 to delete fire watches and temperature monitoring inside primary containment upon failure of a detector inside primary containment (page II-42). The bases for the LCO compensatory actions for inoperable detectors inside primary containment were also changed. (pages II-65 and 66).	1/29/01 (effective 2/1/01)

		Page	Rev.
REVISION LOG		i	7
TABLE OF CONTENTS		ii	7
PART I - INTRODUCTION		I-1	1
1.0	Background	I-1	
2.0	Purpose	I-1	
3.0	Scope	I-1	
4.0	References-Appendix A Program	I-4	
5.0	References-Appendix R Program	I-7	
6.0	References-Fire Protection Improvement Program (FPIP)	I-11	
PART II - FIRE PROTECTION PLAN		II-1	7
1.0	Purpose and Scope	II-1	
2.0	Objectives of the Fire Protection Plan	II-1	
3.0	Basis of the Fire Protection Plan	II-1	
4.0	References	II-2	
5.0	Definitions	II-5	
6.0	Fire Protection Quality Assurance	II-13	
7.0	Fire Protection Organization/Programs	II-14	
8.0	Fire Protection Program Administrative and Technical Controls	II-18	
9.0	Emergency Response	II-20	
10.0	Control of Combustibles	II-24	
11.0	Control of Ignition Sources	II-25	
12.0	Description of Fire Protection Systems and Features	II-26	

		Page	Rev.
PART II - FIRE PROTECTION PLAN (Continued)			
13.0	Fire Protection System Impairments and Compensatory Actions	II-36	
14.0	Fire Protection Systems and Features, Operating Requirements (OR's) and Surveillance Requirements (SR's)	II-39	
PART III - SAFE SHUTDOWN CAPABILITIES		III-1	1
1.0	Introduction	III-1	
2.0	Safe Shutdown Functions	III-2	
3.0	Analysis of Safe Shutdown Systems	III-3	
4.0	Safe Shutdown Systems	III-8	
5.0	Identification of Safe Shutdown System Components	III-17	
6.0	Identification of Safe Shutdown Circuits and Cables	III-18	
7.0	Associated Circuits of Concern	III-18	
8.0	High/Low Pressure Boundary Interfaces	III-22	
9.0	Location of Safe Shutdown Equipment, Cables and Raceways	III-23	
10.0	Safe Shutdown System Separation Evaluation Methodology	III-23	
11.0	References	III-24	
PART IV - ALTERNATE SHUTDOWN CAPABILITY		IV-1	1
1.0	Introduction	IV-1	
2.0	Discussion	IV-1	
3.0	Alternate Control Room Capabilities	IV-1	
4.0	References	IV-4	

		Page	Rev.
PART V - EMERGENCY LIGHTING AND REACTOR COOLANT PUMP OIL COLLECTION		V-1	5
1.0	Introduction	V-1	
2.0	Emergency Lighting	V-1	
3.0	Reactor Coolant Pump Oil Collection	V-2	
4.0	References	V-3	
PART VI - NFPA CODE EVALUATION		VI-1	5
1.0	Introduction	VI-1	
2.0	Scope	VI-1	
3.0	Applicable NFPA Codes	VI-2	
PART VII - DEVIATIONS AND EVALUATIONS		VII-1	5
1.0	Introduction	VII-1	
2.0	Deviations to 10CFR50 Appendix R	VII-1	
3.0	SQN 86-10 Evaluations for 10CFR50 Appendix R	VII-39	
4.0	Deviations to BTP 9.5-1 Appendix A	VII-91	
5.0	NFPA Code Deviations	VII-99	
	Attachment 1 - Sprinkler System Criteria for Resolving Intervening Combustible Concerns	VII-105	
PART VIII - CONFORMANCE TO APPENDIX A TO BTP 9.5-1 GUIDELINES		VIII-1	4
PART IX - APPENDIX R COMPLIANCE MATRIX		IX-1	1
PART X - FIRE HAZARDS ANALYSIS		X-1	1

LIST OF TABLES

PART II - FIRE PROTECTION PLAN

		Page
Table 5.1	Operational Modes	II-12
Table 3.3-11	Minimum Fire Detector Instruments Operable	II-43
Table 3.7-5	Fire Hose Stations	II-57

PART III- SAFE SHUTDOWN CAPABILITIES

Table III-1	Safe Shutdown Systems and Subsystems by Key	III-26
Table III-2	Shutdown Logic Component List	III-27
Table III-3	Instrumentation List For Main Control Room	III-58

PART V - EMERGENCY LIGHTING AND REACTOR COOLANT PUMP OIL COLLECTION

Table V-1	8-Hour Emergency Lighting Units	V-4

PART VII - DEVIATIONS AND EVALUATIONS

Table 2.0-1	Process Control Requirements for Validating Appendix R Deviation Bases	VII-33
Table 2.2-1	Control Building Rooms Containing Redundant Safe Shutdown Equipment, without Fire Detection and/or Automatic Suppression	VII-34
Table 2.12-1	Auxiliary Building Rooms Containing Redundant Safe Shutdown Equipment, without Fire Detection and/or Automatic Suppression	VII-35
Table 2.12-2	Auxiliary Building Rooms Containing Redundant Safe Shutdown Equipment, with only Partial Fire Detection and/or Automatic Suppression	VII-38
Table VII-1	Auxiliary Building Special Purpose Doors	VII-107
Table VII-2	Main Control Room Bullet Resistant Security Doors	VII-108

Table VII-3	Added Auxiliary Building Fire Rated Doors	VII-108
Table VII-4	Alarmed Security Doors	VII-109
Table VII-5	Certified Fire Dampers	VII-110
Table VII-6	Equivalent Fire Dampers	VII-112
Table VII-7	Certification/Equivalent Construction Features	VII-113
Table VII-8	Added Fire Dampers in HVAC Ducts	VII-114

LIST OF FIGURES

PART II - FIRE PROTECTION PLAN

(All drawings will be current active version)

Figure II-1	1,2-47W850-1	Flow Diagram Fire Protection and Raw Service Water
Figure II-2	1,2-47W850-2	Flow Diagram Fire Protection and Raw Service Water
Figure II-3	1,2-47W850-3	Flow Diagram Fire Protection and Raw Service Water
Figure II-4	1,2-47W850-4	Flow Diagram Transformer Fire Protection System
Figure II-5	1,2-47W850-5	Flow Diagram Transformer, Yard & MWTP HPFP
Figure II-6	1,2-47W850-6	Flow Diagram Fire Protection
Figure II-7	1,2-47W850-7	Flow Diagram Fire Protection
Figure II-8	1,2-47W850-8	Flow Diagram Fire Protection
Figure II-9	1,2-47W850-9	Flow Diagram Fire Protection
Figure II-10	1,2-47W850-10	Flow Diagram Fire Protection
Figure II-11	1,2-47W850-11	Flow Diagram Fire Protection
Figure II-12	1,2-47W832-1	Flow Diagram Raw Service Water Cooling and Fire Protection
Figure II-13	1,2-47W832-2	Flow Diagram Raw Service Water, Fire Protection, and Bearing Lube System
Figure II-14	1,2-47W832-3	Flow Diagram Fire Protection and Raw Service Water
Figure II-15	1,2-47W843-1	Flow Diagram CO_2 Storage, Fire Protection and Purging System
Figure II-16	1,2-47W843-2	Flow Diagram CO_2 Storage and Fire Protection
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
Figure II-19	1,2-47W611-26-1	Mechanical Logic Diagram High Pressure Fire Protection
Figure II-20	1,2-47W611-26-2	Mechanical Logic Diagram High Pressure Fire Protection

LIST OF FIGURES

PART II - FIRE PROTECTION PLAN (Continued)

Figure II-21	1,2-47W610-39-1	Mechanical Control Diagram CO2 Storage Fire Protection and Purging System
Figure II-22	1,2-47W610-39-2	Mechanical Control Diagram CO2 Storage Fire Protection and Purging System
Figure II-23	1,2-47W611-39-1	Logic Diagram CO2 Storage, Fire Protection Purging System
Figure II-24	1,2-47W611-39-2	Logic Diagram CO2 Storage, Fire Protection and Purging System
Figure II-25	1,2-47W611-13-1	Mechanical Logic Diagram Fire Detection System
Figure II-26	1,2-47W611-13-2	Mechanical Logic Diagram Fire Detection System
Figure II-27	1,2-47W611-13-3	Mechanical Logic Diagram Fire Detection System
Figure II-28	1,2-47W611-13-4	Mechanical Logic Diagram Fire Detection System
Figure II-29	1,2-47W611-13-5	Mechanical Logic Diagram Fire Detection System
Figure II-30	1,2-47W611-13-6	Mechanical Logic Diagram Fire Detection System
Figure II-31	1,2-47W611-13-7	Mechanical Logic Diagram Fire Detection System
Figure II-32	1,2-47W600-245	Mechanical Instruments and Controls
Figure II-33	1,2-47W600-246	Mechanical Instruments and Controls
Figure II-34	1,2-47W600-247	Mechanical Instruments and Controls
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
Figure II-40	1,2-47W600-253	Mechanical Instruments and Controls

LIST OF FIGURES

PART II - FIRE PROTECTION PLAN (Continued)

Figure II-41	1,2-47W600-254	Mechanical Instruments and Controls
Figure II-42	1,2-47W600-255	Mechanical Instrumets and Controls
Figure II-43	1,2-47W600-256	Mechanical Instruments and Controls
Figure II-44	1,2-47W600-257	Mechanical Instruments and Controls
Figure II-45	1,2-47W600-258	Mechanical Instruments and Controls
Figure II-46	1,2-47W600-259	Mechanical Instruments and Controls
Figure II-47	1,2-47W600-260	Mechanical Instruments and Controls
Figure II-48	1,2-47W600-270	Mechanical Instruments and Controls

PART III - SAFE SHUTDOWN CAPABILITIES

Figure III-1 Appendix R Safe Shutdown Logic Diagram

PART X - FIRE HAZARDS ANALYSIS

Figure X-1	1,2-47W494-1	Auxiliary Building Compartmentation EL 653 & 669
Figure X-2	1,2-47W494-2	Auxiliary Building and Reactor Building Compartmentation EL 685 & 690
Figure X-3	1,2-47W494-3	Auxiliary Building Compartmentation EL 706 & 714
Figure X-4	1,2-47W494-4	Auxiliary Building Compartmentation EL 732 & 734
Figure X-5	1,2-47W494-5	Auxiliary Building Compartmentation EL 749, 759, & 763
Figure X-6	1,2-47W494-6	Control Building Compartmentation EL 669 & 685
Figure X-7	1,2-47W494-7	Control Building Compartmentation EL 706 & 732
Figure X-8	1,2-47W494-8	Diesel Generator Building Compartmentation EL 722 & 740.5
Figure X-9	1,2-47W494-9	ERCW Pumping Station Compartmentation EL 625 & 688
Figure X-10	1,2-47W494-10	ERCW Pumping Station Compartmentation EL 704 & 720

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
TABLE OF CONTENTS

SECTION	FOR	SR	Associated Table
Section 14.1 - FIRE DETECTION INSTRUMENTATION	3.3.3.8	4.3.3.8	3.3-11
Section 14.2 - FIRE SUPPRESSION WATER SYSTEM	3.7.11.1	4.7.11.1	N/A
Section 14-3 - SPRAY AND/OR SPRINKLER SYSTEMS	3.7.11.2	4.7.11.2	N/A
Section 14.4 - CO_2 SYSTEMS	3.7.11.3	4.7.11.3	N/A
Section 14.5 - FIRE HOSE STATIONS	3.7.11.4	4.7.11.4	3.7-5
Section 14.6 - FIRE BARRIER PENETRATIONS	3.7.12	4.7.12	N/A
Section 14.7 - EMERGENCY BATTERY LIGHTING UNITS	3.7.14	4.7.14	N/A

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 Primary 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.
      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.

   2. For inoperable equipment inside Primary Containment, 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.

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 instruments which are not accessible during plant operation shall be demonstrated OPERABLE by the performance of a CHANNEL FUNCTIONAL TEST at least once per 18 months during COLD SHUTDOWNS.

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 Rev. 7

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			
48	Corridor, Control Bldg. E1. 669	4			

TABLE 3.3-11 Rev. 7

MINIMUM INSTRUMENTS OPERABLE

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
49	Corridor, Control Bldg. El. 669	4			
50	Mech. Equip. Rm. Col. C1, El. 669	2			
51	Mech. Equip. Rm. Col. C1, El. 669			2	
52	Mech. Equip. Rm. Col. C3, El. 669	2			
53	Mech. Equip. Rm. Col. C3, El. 669			2	
54	250-V Batt. Rm. 1, El. 669	3			
55	250-V Batt. Rm. 1, El. 669			3	
56	250-V Batt. Bd. Rm. 1, El. 669	2			
57	250-V Batt. Bd. Rm. 1, El. 669	2			
58	250-V Batt. Bd. Rm. 2, El. 669	2			
59	250-V Batt. Bd. Rm. 2, El. 669	2			
60	250-V Batt. Rm. 2, El. 669	3			
61	250-V Batt. Rm. 2, El. 669			3	
62	24-V & 48-V Batt. Rm. El. 669	3			
63	24-V & 48-V Batt. Rm. El. 669			3	
64	24-V & 48-V Batt. Bd. Rm., El. 669	2			
65	24-V & 48-V Batt. Bd. Rm., El. 669	2			
66	Communications Rm. El. 669	4			
67	Communications Rm. El. 669	4			
68	Mech. Equip. Rm. El. 669	2			
69	Mech. Equip. Rm. El. 669			2	
70	Aux. Bldg. A5-A11, CoL.W-X, El. 669	5			
71	Aux. Bldg. A5-A11, CoL.W-X, El. 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, El. 669	8			
89	Aux. Bldg. Corridor A1-A8, El. 669	8			
90	Aux. Bldg. Corridor A8-A15, El. 669	8			
91	Aux. Bldg. Corridor A8-A15, El. 669	8			
92	Aux. Bldg. Corridor Col. U-W, El. 669	4			
93	Aux. Bldg. Corridor Col. U-W, El. 669	4			

TABLE 3.3-11 Rev. 7

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, Col. Q-U, E1. 690	10			
111	Aux. Bldg. A1-A8, Col. Q-U, E1. 690	10			
112	Aux. Bldg. A8-A15, Col. Q-U, E1. 690	9			
113	Aux. Bldg. A8-A15, Col. Q-U, E1. 690	9			
114	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, Col. U-W, E1. 714	7			
135	Aux. Bldg. A5-A11, Col. U-W, E1. 714	7			
136	Heating & Vent. Rm. E1. 714	4			
137	Heating & Vent. Rm. E1. 714	4			
138	Heating & Vent. Rm. E1. 714	4			

TABLE 3.3-11 Rev. 7

MINIMUM INSTRUMENTS OPERABLE

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

TABLE 3.3-11 Rev. 7

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			

TABLE 3.3-11 Rev. 7

MINIMUM INSTRUMENTS OPERABLE

FIRE ZONE	INSTRUMENT LOCATION	IONIZATION	PHOTO-ELECTRIC	THERMAL	INFRARED
237	Mech. Eqpt. Rm. El. 749	1			
238	Mech. Eqpt. Rm. El. 749	1			
239	Mech. Eqpt. Rm. El. 749	2			
240	Mech. Eqpt. Rm. El. 749	2			
241	480-V XFMR Rm. 1A El. 749	3			
242	480-V XFMR Rm. 1A El. 749	3			
243	480-V XFMR Rm. 1B El. 749	3			
244	480-V XFMR Rm. 1B El. 749	3			
245	480-V XFMR Rm. 2A El. 749	3			
246	480-V XMFR Rm. 2A El. 749	3			
247	480-V XMFR Rm. 2B El. 749	3			
248	480-V XMFR Rm. 2B El. 749	3			
249	125-V Batt. Rm. I El. 749	1			
250	125-V Batt. Rm. I El. 749	1			
251	125-V Batt. Rm. II El. 749	1			
252	125-V Batt. Rm. II El. 749	1			
253	125-V Batt. Rm. III El. 749	1			
254	125-V Batt. Rm. III El. 749	1			
255	125-V Batt. Rm. IV El. 749	1			
256	125-V Batt. Rm. IV El. 749	1			
257	480-V Bd. Rm. 1B El. 749	4			
258	480-V Bd. Rm. 1B El. 749	4			
259	480-V Bd. Rm. 1A El. 749	4			
260	480-V Bd. Rm. 1A El. 749	4			
261	480-V Bd. Rm. 2A El. 749	4			
262	480-V Bd. Rm. 2A El. 749	4			
263	480-V Bd. Rm. 2B El. 749	4			
264	480-V Bd. Rm. 2B El. 749	4			
267	Aux. Inst. Rm. El. 685	8			
268	Aux. Inst. Rm. El. 685			9	
269	Computer Rm. El. 685	4			
270	Computer Rm. El. 685			4	
271	Aux. Instr. Rm. El. 685	8			
272	Aux. Instr. Rm. El. 685			9	
273	Computer Rm. Corridor	3			
276	Intk. Pump Sta. El. 690 & 670.5	15			
277	ERCW Pump Sta. El. 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		
352	U/1 Lwr. Compt. Coolers, El. 693		4		

TABLE 3.3-11

Rev. 7

MINIMUM INSTRUMENTS OPERABLE

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. Wall, 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			
600	U1 Post Accident Sampling Facility El 706.0	1			
601	U1 Post Accident Sampling Facility El 706.0	1			

TABLE 3.3-11

MINIMUM INSTRUMENTS OPERABLE

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.

TABLE 3.7-5
FIRE HOSE STATIONS

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

TABLE 3.7-5
FIRE HOSE STATIONS

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

TABLE 3.7-5
FIRE HOSE STATIONS

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 primary containment differ from those for other areas due to radiological conditions and potential hazards inside containment.

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.

LIST OF FIGURES

(All drawings will be current active version)

FPR Figure #	TVA Drawing	Title
Figure II-1	1,2-47W850-1	Flow Diagram Fire Protection and Raw Service Water
Figure II-2	1,2-47W850-2	Flow Diagram Fire Protection and Raw Service Water
Figure II-3	1,2-47W850-3	Flow Diagram Fire Protection and Raw Service Water
Figure II-4	1,2-47W850-4	Flow Diagram Transformer Fire Protection System
Figure II-5	1,2-47W850-5	Flow Diagram Transformer, Yard & MWTP HPFP
Figure II-6	1,2-47W850-6	Flow Diagram Fire Protection
Figure II-7	1,2-47W850-7	Flow Diagram Fire Protection
Figure II-8	1,2-47W850-8	Flow Diagram Fire Protection
Figure II-9	1,2-47W850-9	Flow Diagram Fire Protection
Figure II-10	1,2-47W850-10	Flow Diagram Fire Protection
Figure II-11	1,2-47W850-11	Flow Diagram Fire Protection
Figure II-12	1,2-47W832-1	Flow Diagram Raw Service Water Cooling and Fire Protection
Figure II-13	1,2-47W832-2	Flow Diagram Raw Service Water, Fire Protection, and Bearing Lube System
Figure II-14	1,2-47W832-3	Flow Diagram Fire Protection and Raw Service Water
Figure II-15	1,2-47W843-1	Flow Diagram CO_2 Storage, Fire Protection and Purging System
Figure II-16	1,2-47W843-2	Flow Diagram CO_2 Storage and Fire Protection
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
Figure II-19	1,2-47W611-26-1	Mechanical Logic Diagram High Pressure Fire Protection
Figure II-20	1,2-47W611-26-2	Mechanical Logic Diagram High Pressure Fire Protection

LIST OF FIGURES
(Continued)

FPR Figure #	TVA Drawing	Title
Figure II-21	1,2-47W610-39-1	Mechanical Control Diagram CO2 Storage Fire Protection and Purging System
Figure II-22	1,2-47W610-39-2	Mechanical Control Diagram CO2 Storage, Fire Protection and Purging System
Figure II-23	1,2-47W611-39-1	Logic Diagram CO2 Storage, Fire Protection Purging System
Figure II-24	1,2-47W611-39-2	Logic Diagram CO2 Storage, Fire Protection and Purging System
Figure II-25	1,2-47W611-13-1	Mechanical Logic Diagram Fire Detection System
Figure II-26	1,2-47W611-13-2	Mechanical Logic Diagram Fire Detection System
Figure II-27	1,2-47W611-13-3	Mechanical Logic Diagram Fire Detection System
Figure II-28	1,2-47W611-13-4	Mechanical Logic Diagram Fire Detection System
Figure II-29	1,2-47W611-13-5	Mechanical Logic Diagram Fire Detection System
Figure II-30	1,2-47W611-13-6	Mechanical Logic Diagram Fire Detection System
Figure II-31	1,2-47W611-13-7	Mechanical Logic Diagram Fire Detection System
Figure II-32	1,2-47W600-245	Mechanical Instruments and Controls
Figure II-33	1,2-47W600-246	Mechanical Instruments and Controls
Figure II-34	1,2-47W600-247	Mechanical Instruments and Controls
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
Figure II-40	1,2-47W600-253	Mechanical Instruments and Controls

LIST OF FIGURES
(Continued)

FPR Figure #	TVA Drawing	Title
Figure II-41	1,2-47W600-254	Mechanical Instruments and Controls *
Figure II-42	1,2-47W600-255	Mechanical Instruments and Controls
Figure II-43	1,2-47W600-256	Mechanical Instruments and Controls
Figure II-44	1,2-47W600-257	Mechanical Instruments and Controls
Figure II-45	1,2-47W600-258	Mechanical Instruments and Controls
Figure II-46	1,2-47W600-259	Mechanical Instruments and Controls
Figure II-47	1,2-47W600-260	Mechanical Instruments and Controls
Figure II-48	1,2-47W600-270	Mechanical Instruments and Controls

(* Changes are to Figure Numbers Only)