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May 18, 1985

NUCLEAR LICENSING & SAFETY DEPARTMENT

U. S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D. C. 20555

Attention: Mr. Harold R. Denton, Director

Dear Mr. Denton:

SUBJECT: Grand Gulf Nuclear Station
Units 1 and 2
Docket Nos. 50-416 and 50-417
License No. NPF-29
File: 0260/15742
Proposed FSAR Changes Associated with Recent MP&L Fire Protection Review
AECM-85/0164

By letter AECM-85/0129 dated May 7, 1985, Mississippi Power & Light Company (MP&L) provided a summary report of a recent review of Grand Gulf Nuclear Station in the area of fire protection. As discussed in that letter, this review was conducted to update an earlier comparison of the GGNS Fire Protection Program with the latest interpretations of 10CFR50 Appendix R. The review was also conducted to evaluate the impact of more recent NRC guidance as related to MP&L's positions regarding Appendix R requirements. As a result of the review, MP&L found it necessary to revise the Fire Hazards Analysis (FHA). The revised FHA, superseding that currently provided in the FSAR Appendix 9A, was submitted to the NRC by the above referenced MP&L letter.

MP&L proposed in the April 25, 1985 meeting with the NRC that the revised FHA be removed from the FSAR and controlled separately. Updates to this document would be provided to the NRC consistent with the update requirements of 10CFR50.71(e). Proposed FSAR changes associated with the removal of the FHA from the FSAR are attached. Additional proposed FSAR changes resulting from the MP&L Appendix R review effort are also incorporated into the attachment. These changes include revisions to the evaluation comparing Appendix R and the GGNS Fire Protection Program (previously Table 9A-4, now Table 9.5-12). These proposed changes are undergoing final review and are not expected to change significantly in technical content prior to being incorporated into the Updated

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FSAR in December 1985. As discussed with the NRC Staff on May 15, 1985, a revised listing of systems determined necessary to achieve and maintain safe shutdown is also included in the attachment. These proposed changes are provided for NRC information.

If you have any questions, please contact this office.

Yours truly,

L. F. Dale
Director

JGC:af
Attachment

cc: Mr. J. B. Richard (w/a)
Mr. O. D. Kingsley, Jr. (w/a)
Mr. R. B. McGehee (w/a)
Mr. N. S. Reynolds (w/a)
Mr. G. B. Taylor (w/o)
Mr. R. C. Butcher (w/a)

Mr. James M. Taylor, Director (w/a)
Office of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dr. J. Nelson Grace, Regional Administrator (w/a)
U. S. Nuclear Regulatory Commission
Region II
101 Marietta St., N. W., Suite 2900
Atlanta, Georgia 30323

Attachment
AECM-85/0164

GRAND GULF NUCLEAR STATION

FINAL SAFETY ANALYSIS REPORT

Proposed FSAR Changes Resulting From Recent Review

In The Area Of Fire Protection (10 CFR 50 Appendix R)

May 18, 1985

VOLUME 15

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The largest event known to have occurred in the Gulf Coast Basin, not associated with a structure, is the strong intensity MM VI Donaldsonville, Louisiana, earthquake of October 19, 1930. If this earthquake occurred at the site, a peak acceleration of 0.07-0.10 g would result, according to the intensity-acceleration curves of Neumann (1954). A safe shutdown peak horizontal acceleration of 0.15 g and vertical acceleration of 0.10 g were selected for plant design giving additional conservatism. Design spectra for the safe shutdown earthquake with horizontal acceleration of 0.15 g and for a variety of damping values have been used for analysis of plant structures and equipment.

1.2.2.1.6 Unusual Site Characteristics

There are no unusual site characteristics.

1.2.2.2 General Arrangement of Structures and Equipment

The principal buildings and structures associated with each unit include the containment structure, the turbine building, the auxiliary building, the common control building, the diesel generator building, the standby service water cooling tower and basin, the enclosure building, the common radwaste building, and the natural draft cooling tower. A common structure which houses the administration offices, clean machine shop, and guardhouse is also provided.

These buildings and structures are founded upon suitable material for their intended application. Structures essential to the safe operation and shutdown of the plant are designed to withstand more extreme loading conditions than normally considered in conventional nonnuclear design practice. The buildings and internal structures so designated are designed to provide protection as required from tornadoes, earthquakes, and the failure of equipment producing flooding, missiles, and pipe whip. Additional discussion of design considerations may be found in Chapter 3.

Location and orientation of the buildings on the site are shown in Figure 1.2-1. The general arrangement of the buildings and equipment locations are shown in Figures 1.2-2 through 1.2-15.

a. The containment structure, shown in Figures 1.2-2 through 1.2-8, is a seismic Category I structure which encloses the reactor coolant system, the drywell, suppression pool, upper pool, and some of the engineered safety feature systems and supporting systems. The functional design basis of the containment, including its penetrations and isolation valves, is to contain with adequate design margin the energy released from a design basis loss-of-coolant accident and to provide a leaktight barrier against the uncontrolled release of radioactivity to the environment, even assuming a partial loss of engineered safety features.

Amend.

TABLE 1.7-1

Section 2 (Cont.)

Drawing No. (FSAR Figure No.)	Title
E-0700	Raceway Plan Control Bldg El 93 Ceiling Area 25B
E-0701	Raceway Plan Control Bldg El 111-0 Area 25B
E-0702	Raceway Plan Control Bldg El 133-0 Area 25B
E-0703	Raceway Plan Control Bldg El 148-0 Area 25B
E-0704	Raceway Plan Control Bldg El 166-0 Area 25B
E-0716	Raceway Plan Control Bldg Sections and Details
E-0725-000 Shs A-51 (except Shs 15, 16, 17, 36, 41, 42, 43, 45)	Raceway Notes, Symbols and Details
E-0950	Raceway Plan Control Bldg El 93-0, 111-0, 133-0, 148-0 Fire & Smoke Detection System Units 1 & 2
E-0951	Raceway Plan Control Bldg El 166-0, 177-0, 189-0 Fire & Smoke Detection System Units 1 & 2
E-0961	Raceway Plan Radwaste Bldg El 93-0 Fire & Smoke Detection System Units 1 & 2
E-0962	Raceway Plan Radwaste Bldg El 118-0 Fire & Smoke Detection System Units 1 & 2

Amend.

TABLE 1.7-1

Section 2 (Cont.)

Drawing No. (FSAR Figure No.)	Title
E-1713	Raceway Containment Bldg Misc Sects and Details
E-1714	Raceway Plan Diesel Generator Bldg Area 12 El 133-0
E-1715	Raceway Plan Diesel Generator Bldg Area 12 El 158-0
E-1716	Raceway Plans Cooling Towers (SSW) No. 1 & 2
E-1719	Raceway Plan Diesel Generator Bldg Misc Sects & Details
E-1805	Raceway Plan Turbine Bldg El 93-0 Fire & Smoke Detection System Unit 1
E-1806	Raceway Plan Turbine Bldg El 113-0 Fire & Smoke Detection System Unit 1
E-1807	Raceway Plan Turbine Bldg El 133-0 Fire & Smoke Detection System Unit 1
E-1808	Raceway Plan Turbine Bldg El 166-0 Fire & Smoke Detection System Unit 1
E-1809	Raceway Plan Aux Bldg & Cntmt El 93-0, 100-9 Fire & Smoke Detection System Unit 1

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TABLE 1.7-1

Section 2 (Cont.)

Drawing No. (FSAR Figure No.)	Title
E-1800	Raceway Plan Aux Bldg & Cntmt El 119-0, 120-10, 114-6 Fire & Smoke Detection System Unit 1
E-1801	Raceway Plan Aux Bldg & Cntmt El 139-0, 135-4, 147-7 Fire & Smoke Detection System Unit 1
E-1802	Raceway Plan Aux Bldg & Cntmt El 161-10, 166-0 Fire & Smoke Detection System Unit 1
E-1803	Raceway Plan Aux Bldg & Cntmt El 184-6, 185-0 Fire & Smoke Detection System Unit 1
E-1804	Raceway Plan Aux Bldg & Cntmt El 208-10 Fire & Smoke Detection System Unit 1
E-2635	Public Address System Riser Diagram Unit 2

TABLE 1.10-1

CROSS-REFERENCE LIST OF DRAWING NUMBERS
AND FSAR FIGURE NUMBERS

Drawing No.	System Identification	FSAR Figure No.
C-0012	Orientation of Principal Structures	1.2-1
M-0001	General Arrangement Plan at El. 93'-0" and 100'-9"	1.2-2
M-0002-2	General Arrangement Plan at El. 113'-0", 111'-0", 119'-0", 112'-0", and 114'-6"	1.2-3
M-0003-2	General Arrangement Plan at El. 133'-0", 148'-0", 139'-0", 135'-4", and 147'-7"	1.2-4
M-0004-2	General Arrangement Plan at El. 166'-0", 161'-10", and 170'-0"	1.2-5
M-0005-2	General Arrangement Plan at El. 184'-6", 184'-0", and 189'-0"	1.2-6
M-0006-2	General Arrangement Plan at El. 208'-10"	1.2-7
M-0007-3	General Arrangement Sections "AA" and "BB"	1.2-8
M-1006	Turbine Building General Arrangement Sections "A-A" and "B-B"	1.2-9A
M-1007	Turbine Building General Arrangement Sections "C-C," "D-D," and "E-E"	1.2-9B
M-0017-7	Radwaste Building Plan at El. 93'-0"	1.2-10,
M-0018-14	Radwaste Building Plan at El. 118'-0"	1.2-11,
M-0019-15	Radwaste Building Plan at El. 136'-0"	1.2-12,

Amend.

and designed to minimize the adverse effects of fires on structures, systems, and components important to safety. Fire-fighting systems shall be designed to assure that their rupture or inadvertent operation does not significantly impair the safety capability of these structures, systems, and components.

Discussion

Structures, systems, and components important to safety have been designed to meet the requirements of Criterion 3. Fire protection systems meeting the requirements of Criterion 3 have been provided.

The plant is designed to minimize the probability and effect of fires. Noncombustible and fire-resistant materials have been used in the containment, control room, components of safety features systems, and throughout the unit wherever practical to reduce fire potential. Equipment and facilities for fire proteciton, including detection, alarms and extinguishments, have been provided to protect both plant equipment and personnel from fire and the resultant release of toxic vapors. Both automatic and manual types of fire-fighting equipment have been provided.

Fire protection has been provided by automatic deluge, water spray, sprinkler, Halon 1301, carbon dioxide, manual hose stations, and portable extinguishers.

Fire-fighting systems have been designed to assure that their rupture or inadvertent operation will not significantly impair systems important to safety.

The fire protection system consists of a reliable system, designed and installed in accordance with the requirements of the National Fire Protection Association, The Nuclear Energy Liability Property Insurance Association, and the applicable local codes and regulations.

The fire protection system has been provided with test valves and facilities for periodic testing. All equipment is accessible for periodic inspection.

The fire protection system is discussed in detail in subsection 9.5.1.

3.1.2.1.4 Criterion 4 - Environmental and Missile Design Bases

Structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents. These structures, systems, and components shall be appropriately protected against dynamic effects,

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6.4.1 Design Basis

Criteria for the selection of design bases are found in subsection 1.2.1.2.

Protection of the habitability systems of the control room from wind and tornado effects, is discussed in Section 3.3. Flood design is discussed in Section 3.4. Missile protection is discussed in Section 3.5. Protection against dynamic effects associated with the postulated rupture of piping is discussed in Section 3.6. Environmental design is discussed in Section 3.11. Seismic design of electrical components is discussed in Section 3.10.

6.4.1.1 Safety Design Basis

a. The control room envelope, or pressure boundary as shown in Figures 6.4-1 and 6.4-2, includes all instrumentation and controls necessary for safe shutdown of the plant, and is limited to those areas requiring operator access during and after a design basis accident (DBA).

b. Food, water, medical supplies, and sanitary facilities are provided for sustaining an emergency team of three persons for a period of 7 days.

c. The control room HVAC system during emergency mode maintains a suitable environment for sustained occupancy of 12 persons.

d. The radiation exposure of control room personnel through the duration of any one of the postulated design basis accidents discussed in Chapter 15.0 does not exceed the guidelines set by 10 CFR 50, Appendix A, General Design Criterion 19.

e. The habitability systems provide the capability to detect and limit the introduction of chlorine, freon gas, radioactive material, and smoke into the control room.

f. Respiratory, eye, and skin protection is provided for emergency use within areas of the control room envelope.

g. Through the duration of any one of the postulated design basis accidents discussed in Chapter 15.0, the control room ventilation system maintains the control room atmosphere at temperatures suitable for prolonged occupancy.

Amend.

6.4.2 System Design

6.4.2.1 Definition of Control Room Envelope

The control room envelope is shown in Figures 6.4-1 and 6.4-2, and consists of all rooms at the control room elevation of the control building. Included in the envelope, served by the control room HVAC system, are the control room, offices, the kitchen, the toilet, the emergency dormitory, the dining area, the safety-related panel rooms of the upper cable-spreading room, and several closets and storage rooms where access is required after a DBA. Airtight doors are provided at the access points and from the control room envelope.

6.4.2.2 Ventilation System Design

The design, construction, and operation of the control room HVAC system are described in detail in subsection 9.4.1. Figure 9.4-1, a diagram of the control room HVAC system, shows major components, seismic classifications, and instrumentation. A description of the major component flow rates, capacities, and major design parameters is in subsection 9.4.1.

Figure 2.1-2 shows the plant layout, including the location of potential radiological release points with respect to the control room air intakes.

Elevation and plan drawings showing building dimensions and equipment locations are given in Figures 1.2-5 and 1.2-8. Potential sources of toxic gas release are identified in Section 2.2.

Description of the charcoal filter trains is given in subsection 6.5.1.

The volume of the zone served by the HVAC system in the emergency mode or the isolation mode is approximately 253,000 cubic feet.

Description of control room instrumentation for monitoring of radioactivity is given in subsections 7.6.1.2 and 12.3.4.

A description of the smoke detectors is in subsection 9.5.1.

A description of the control logic of the toxic gas monitors, viz., chlorine and freon detectors, is in subsection 7.3.1.1.10. Chlorine detectors are located such that isolation dampers will close prior to the entry of any significant amount of chlorine into the control room.

Amend.

A fire from external sources, which could cause pyrolytic decomposition of construction materials of the ESF filters, is not postulated to occur simultaneously with any other plant accident which could require the operation of the filters for radioiodine removal credit. Therefore, fire is not a credible event which could adversely affect the operation of the ESF filter trains. This position is consistent with Appendix A to NRC Branch Technical Position APCSB 9.5-1, Guidelines for Fire Protection for Nuclear Power Plants, docketed prior to July 1, 1976. See subsection 9.5.1.

Table 6.5-2 tabulates materials used in the filter trains, but for the above reasons, does not provide a detailed breakdown of quantity and composition.

6.5.2 Containment Spray System

6.5.2.1 Design Bases

a. The containment spray system (CSS) is a part of the residual heat removal (RHR) system.

b. The CSS provides containment cooling following a loss-of-coolant accident, in addition to being a fission product removal mechanism. (Refer to subsection 6.2.2 for the heat removal function of the CCS.)

c. The CSS consists of two completely redundant and independent trains.

d. The CSS is designed to remain operable in the containment accident environment, which is discussed in Section 3.11.

e. The CSS is designed such that a single failure of any active component will not degrade the ability of the system to fulfill design objectives. Each train of the CSS receives power from a separate emergency diesel generator, in the event that offsite power is unavailable during an accident. The two trains are physically separate from each other, so that a failure in one train will not result in failure of the other train due to fire, flooding, pipe breaks or missiles.

f. The CSS is designed to seismic Category I requirements. System components as appropriate are designed to meet ASME Code Section III, Class 2 requirements.

g. The CSS is designed to permit periodic testing as described in subsections 6.2.2, and 6.5.2.4.

1 and OC205 for Unit 2 on Figure 6.4-1. The two panels are 9 feet apart, and all cabling associated with the panels and the systems which they operate are separated as described in subsections 7.1.2.2 and 8.3.1.4.

Items of the following systems which are essential to the residual heat removal function during the safe shutdown period have controls and instrumentation located on the remote shutdown panels:

b. Pipe whip and jet forces resulting from pipe rupture

c. Missiles resulting from equipment failure

d. Fire

The ability of the SSW system to withstand explosions, fires, airplane crashes, and icing is described in subsections 2.2.3 and 3.5.1 and the Fire Hazards Analysis Report. Two redundant cooling towers with both units. Each tower is located on a separate basin. The combined basin volume is sized to provide supply to the SSW systems of both units for a minimum period of 30 days following a LOCA in one unit coincident with a safe shutdown of the other unit. (Refer to subsection 9.2.5 for a discussion of compliance of the SSW system with the requirements of NRC Regulatory Guide 1.27, Rev. 2.) The two SSW pumps (per unit), or either of the two SSW pumps in conjunction with the HPCS service water pump (one per unit), are sized to provide cooling water to safely shut down either unit following a LOCA. The discharge lines of the two SSW pumps associated with each tower are intertied via the basin recirculation line to permit additional flexi-bility of operation. In addition, a line interconnecting the discharge of each SSW pump within a basin permits transfer of SSW basin water from one basin to the other. Each line interconnecting the two SSW pumps discharge lines has redundant automatic isolation valves. The SSW and HPCS service water pumps have sufficient NPSH available at the low basin water level. The required NPSH for the pumps is listed in Table 9.2-4. The SSW system is designed to withstand a single active or passive failure coincident with a loss of offsite power without losing its capability to shut down the reactor safely following an accident. A single failure analysis is given in Tables 9.2-1 and 9.2-2.

The SSW system is designed to perform its required function for all modes of system operation. Analysis of system operation for the various modes listed below has determined that Mode III is the critical mode for evaluating the capability of the SSW system to perform its safety function.

Mode I - Normal shutdown of Units 1 and 2 with offsite power

Mode II - Normal shutdown of Units 1 and 2 without offsite power

Mode III - LOCA in one unit coincident with worst single active failure of an ESF component in that unit; normal shutdown of the other unit; total loss of offsite power to both units

Amend.

h. For compliance with code standards and Regulatory Guides refer to Section 3.2 and Appendix 3A.

i. Fire protection has been evaluated and is described in subsection 9.5.1.

9.4.5.1.2 Power Generation Design Bases

a. The systems are designed to provide a reliable source of fresh air and an environment with controlled temperature and humidity to ensure the comfort and safety of personnel and the integrity of plant equipment.

b. The ventilation and cooling systems are designed to permit periodic inspection of the principal components.

c. A water drip on the head of the intake louver and a slope in the sill of the louver are provided for the air intake louvers in the areas of the HPCS diesel generator room, standby diesel generator rooms, and standby service water pumphouses to reduce the possibility of water in the air path.

9.4.5.2 System Description

9.4.5.2.1 Safeguard Switchgear and Battery Rooms

The ventilation system for the safeguard switchgear and battery rooms is shown schematically in Figures 9.4-8a and 8b. The supply system consists of four 50-percent-capacity fan units complete with outside air filters, electric heating coils, supply air ducts, and controls. Two supply fans operate at all times while the other two fans are on standby. Exhaust air is discharged by four 50-percent-capacity exhaust fan units with separate ducts and controls. Two exhaust fans operate at all times while the other two fans are on standby. The system is also capable of providing ventilation cooling in the control building HVAC equipment room under accident and post-accident conditions, or upon failure of the normal control building HVAC system.

Space design conditions in the safeguard switchgear and battery rooms and in the control building HVAC equipment room are 104 F maximum. The major system components and performance data are given in Table 9.4-7.

9.4.5.2.2 Diesel Generator Rooms

The diesel generator building ventilation system is shown schematically in Figure 9.4-9a. The major system components and performance data are listed in Table 9.4-7.

Amend.

9.5 OTHER AUXILIARY SYSTEMS

9.5.1 Fire Protection System

9.5.1.1 Design Bases

The bases for the design of the fire protection program are presented herein and in the Fire Hazards Analysis Report. An overview of the Fire Hazards Analysis Report is presented in subsection 9.5.1.3. The intent is to provide a defense-in-depth principle by achieving an adequate balance in:

a. Preventing a fire from starting.

b. Quickly detecting and extinguishing fires that occur, thus limiting fire damage.

c. Designing safety-related systems so that a fire that occurs and burns out of control for considerable length of time, will not prevent safe shutdown.

In addition, fire protection systems are designed so that inadvertent operation or failure of any of these systems will not impair safety-related systems.

Fire protection system water and carbon dioxide pipelines, which penetrate the auxiliary buildings, are provided with redundant isolation valves at each penetration. The isolation valves will automatically close in the event of a LOCA. The isolation valves are designed to fail closed. At each fire water penetration, a 4-inch bypass pipeline around the isolation valves is provided. The 4-inch bypass line includes a normally closed 4-inch manual valve which can be operated locally or remotely. The isolation and bypass valves, with respective piping, are designed as seismic Category I.

Fire protection while Unit 1 is in operation and Unit 2 is under construction and the provision for use of public fire departments are addressed in subsections A.8 and B.4, respectively, of Table 9.5-11. A comparison of the Grand Gulf fire protection program with Appendix A to NRC Branch Technical Position APCSB 9.5-1 is presented in Table 9.5-11.

Seismic design requirements are imposed on fire protection systems on an individual basis. Every fire protection system component, which may damage safety-related systems or components as a result of its collapse due to an earthquake, is designed with seismic supports to prevent such occurrence.

The following listed documents, codes, standards, and guidelines are referred to in the fire protection system designs:

a. Documents from the American Nuclear Insurers (ANI):

Amend.

1. Basic Fire Protection for Nuclear Power Plants, April, 1976

2. Specifications for Fire Protection of New Plant, ANI File No. NS-224

b. Pamphlets of the National Fire Protection Association (NFPA):

12	Carbon Dioxide Extinguishing Systems
12A	Halon 1301 Systems
13	Sprinkler Systems, Installation
14	Standpipe & Hose Systems
15	Water Spray Fixed Systems
20	Centrifugal Fire Pumps
22	Water Tanks
24	Outside Protection
30	Flammable & Combustible Liquids Code
37	Stationary Combustion Engines and Gas Turbines
50A	Gaseous Hydrogen Systems at Consumer Site
70	National Electrical Code
75	Electronic Computer/Data Processing Equipment
78	Lightning Protection Code
80	Fire Doors and Windows
90A	Air Conditioning and Ventilating Systems
92M	Waterproofing and Draining of Floors
101	Code for Safety to Life from Fire in Buildings and Structures
196	Fire Hose
204	Guide for Smoke and Heat Venting
214	Water Cooling Towers
321	Basic Classification of Flammable Liquids
803	Nuclear Power Plants

c. Southern Standard Building Code

d. Uniform Building Code

9.5.1.2 System Description

9.5.1.2.1 General Description

The fire protection system consists of an underground yard loop with two 300,000 gallon nominal capacity (maximum usable capacity - 291,358 gallons) water storage tanks at atmospheric pressure, one electrically driven and two diesel-driven fire pumps (1500 gpm at 125 psig, 145 bhp, single-stage, split case, double suction, centrifugal), one jockey fire pump (30 gpm at 130 psig, 3 bhp, six-stage vertical centrifugal), fire water yard mains, hydrants, standpipes, hose stations, sprinklers, deluge spray systems, automatic Halon 1301 systems, automatic

Amend.

and manual carbon dioxide systems, hydrogen detectors, ionization smoke detectors, heat sensors, ultraviolet flame detectors, manual and automatic alarm systems, fire barriers, fire stops, fire breaks, portable fire extinguishers, portable breathing apparatus, smoke and heat ventilation systems, and associated controls and appurtenances.

The fire pumps are sized such that the maximum design system demand for any non-safety-related areas can be supplied by any two operating fire pumps. The maximum design demand of any sprinkler or deluge system is 2717 gpm required for turbine building sprinkler system N1P64D129 or N2P64D129. The 2717 gpm demand with an additional 1000 gpm demand included for manual hose streams (a total of 3717 gpm) can be met if a 118 psig pressure is available at the pump discharge. Two fire pumps can deliver 3717 gpm at a discharge pressure of 118 psig.

The maximum design demand of any sprinkler or deluge system covering safety-related equipment is that of the diesel generator building preaction sprinkler system N1P64D142A, B, C or N2P64D142A, B, C. The 987 gpm demand of this system with an additional demand of 500 gpm included for manual hose streams (a total of 1487 gpm) can be met with a single fire pump running.

The fire fighting water is taken from the two water storage tanks, which are supplied by plant service water. If the water level in either tank drops below a set level, solenoid-operated valves in the 8-inch lines from the plant service water system open, allowing a minimum flow rate of 625 gpm to the storage tanks. At the flow rate of 625 gpm, either storage tank can be refilled from empty in less than 8 hours. The fire pump suction piping is arranged so that any pump can take suction from either water storage tank. An outside hose header test manifold equipped with six hose valves is provided.

The condensate and refueling water storage and transfer system is utilized to supply water to all of the fire suppression systems located inside containment. These fire suppression systems consist of 2 manually actuated containment cooling system charcoal filter train deluge systems and 13 hose stations. Any fire suppression system inside containment would require action by the plant personnel before it would operate.

The condensate and refueling water storage and transfer system utilizes one continuously running 600 gpm pump. Upon sensing high flow in the containment fire protection supply, a flow switch initiates closure of valves in all branch lines and directs the entire flow to the fire protection supply. If the fire-fighting demand is greater than 600 gpm, the standby pump will automatically start on low discharge pressure; a 1200 gpm supply (two pumps operating) is then available for fire fighting. The largest postulated fire protection demand would be 135 gpm for one of the charcoal filter train deluge systems and a 500 gpm demand for hose streams for a total of 635 gpm. Therefore, with both pumps operating, sufficient flow is available. Should the fire last for 2 hours, a total of 76,200 gallons would be required. The condensate tank has a storage

Amend.

capacity of 300,000 gallons; 130,000 gallons of this storage capacity is available for fire fighting. Therefore, a sufficient quantity of water is also available.

If the plant should lose offsite power, the condensate and refueling water storage and transfer system would be inoperable. Therefore, a cross connection from the plant fire water system to the condensate and refueling water storage and transfer system has been provided just outside of containment as a backup fire water source. By realigning three manually operated valves, as shown on Figures 9.5-2 and 9.2-16, a continuous water supply to all fire suppression systems inside containment would be maintained.

The fire protection system is designed to operate and/or fail without inducing failure of engineered safety features. No electrically conductive fire extinguishing agent is automatically released on relays, switchgear, motor control center, or other critical safeguard equipment unless safe shutdown capability can be maintained with the loss of the equipment.

Electrical safety-related divisions and electrical cable protection are addressed in the Fire Hazards Analysis Report. Areas and rooms within the station which contain electrical cables or components of the two electrical divisions, which can independently be used to shut down the nuclear reactor safely, are discussed in the Fire Hazards Analysis Report.

Ventilation systems, including smoke and heat removal systems, are discussed in Table 9.5-11, Section D.4, and the individual system descriptions in Sections 6.4 and 9.4.

9.5.1.2.2 System Operation

9.5.1.2.2.1 Water Supply

The jockey fire pump normally keeps the fire fighting water system pressurized at 130 to 145 psig. Three fire pumps ensure the full required water flow with one fire pump out of service. In the event that a portion of the system is activated, the system pressure will drop, and at 125 psig a low-pressure switch in the system main header will automatically start the electric motor-driven fire pump. If the electric motor-driven fire pump fails to start or cannot meet the demand, the first diesel-driven fire pump will be started automatically by its self-contained batteries after a 15-second delay. If the first diesel-driven fire pump fails to start or cannot meet the demand, the second diesel-driven fire pump will be started automatically by its self-contained batteries after a 30-second delay. Fire pump running, fire pump stopped, loss of power to the electric motor-driven fire pump, loss of battery charge on

the diesel-driven fire pumps, as well as several other operational mode equipment failures, are indicated in the control room. The fire pumps are periodically tested in accordance with the Technical Specifications.

The electric motor-driven fire pump is supplied power through a motor control center located in the water treatment building. The power supply circuit to the electric motor-driven fire pump is protected by a load center supply circuit breaker, a load center feeder circuit breaker, and an electric fire pump motor controller circuit breaker. Selection and setting of the protective trip devices for the aforementioned circuit breakers is in accordance with the guidance provided in NFPA 20-1978 and has been approved for Grand Gulf's use by American Nuclear Insurers (ANI).

The electric fire pump motor controller circuit breaker provides for instantaneous short circuit protection and time delayed locked rotor current protection. The trip setting (adjusted to the manufacturer's recommendation) does not permit a circuit breaker trip at locked rotor current (LRC) unless LRC is sustained for at least 13 to 19 seconds. Locked rotor current (1050 amps) would be supplied for two to three times the normal starting time (5 to 6 seconds), permitting the normal starting of the motor without tripping the electric fire pump motor controller circuit breaker. This protective trip setting meets the guidance provided in NFPA 20: the electric fire pump motor controller circuit breaker shall have a time delay of not over 20 seconds, and the breaker shall permit normal starting of the motor without tripping.

Additional short circuit and cable protection is achieved by providing protective trips of the load center supply circuit breaker and the load center feeder breaker. The load center supply circuit breaker will not trip unless the sum of the LRC and the total of the other full load currents from loads connected to the load center is maintained for at least 40 to 65 seconds. The load center feeder breaker (which feeds the electric fire pump controller) will not trip unless LRC is maintained for at least 27 to 40 seconds. Therefore, the load center supply and the load center feeder circuit breakers will not open earlier than the electric fire pump motor controller circuit breaker.

An outside, 12-inch cement-lined, cast iron, underground yard loop surrounds the entire power block and provides water to hydrants, wet standpipes, hose stations, deluge spray systems, and sprinkler systems. Post-indicator valves are provided for isolating portions of the systems, as required. Fire fighting water system valves have electrical supervision or a locking device and tamper-proof seals, and are periodically inspected in accordance with the Technical Specification requirements. Two-way hydrants are provided on the yard main at approximately 250-foot intervals. Each fire hydrant is provided with an isolation valve in order to isolate the hydrant in the event of physical damage and/or mechanical malfunction. Provided for each hydrant is a hose house equipped with 250 feet of 2-1/2-inch, lined fire hose, two 2-1/2-inch adjustable spray nozzles, one prybar, spanner wrenches, adjustable hydrant wrenches, and one fire axe. The fire water pumps are capable of providing water to any point in the station with the shortest leg of the main fire water loop out of service.

The fire water system in the control building functions primarily as a backup fire fighting source. The water supply to the diesel generator building provides both the primary and backup fire fighting source. The water suppression systems and standpipes in the control building are supplied from a single connection from the underground fire water loop. The water suppression systems and standpipes in the diesel generator building are supplied from a single connection from the underground fire water loop. Therefore, a single line break in the loop connection would only negate all permanent water fire suppression systems in the respective buildings. However, a number of alternative backup measures are available in such an event.

Located adjacent to the diesel generator building are outdoor hose houses. Section valves in the underground fire loop allow yard fire hydrants to operate even if the single building connection is lost due to a break in the line. In addition to the outdoor hoses, multiple 1-1/2 inch hose streams are accessible to the diesel generator building from the auxiliary building.

In the event that a break occurred in the control building fire water loop connection, operation of the gaseous fire suppression systems would not be affected. Portable water extinguishers are available throughout the building and provide a backup to the gaseous suppression system. Areas normally served by water suppression systems can be reached by multiple 1-1/2 inch hose streams from the turbine building. A hose connection has been installed in the standby fresh air filter deluge connections to enable connecting the turbine building fire hose and utilizing the turbine building fire loop as a deluge source.

Amend.

Finally, Grand Gulf has a mobile foam/water pumper available for use by the plant fire brigade.

9.5.1.2.2.2 Hose Stations

Wet standpipe hose stations are located throughout the plant in strategic locations to ensure hose stream plant coverage and to serve as backup for fixed suppression systems. Hose stations have 50, 75, or 100 feet of 1-1/2-inch, lined hose, as deemed necessary, and an adjustable nozzle. Hose stations in areas that contain dry nuclear fuel have fixed non-fogging nozzles. The fire brigade training includes the use of fixed or adjustable nozzles on various possible fires. Typical hose stations are shown in Figure 9.5-4.

9.5.1.2.2.3 Sprinkler Systems

Wet-pipe sprinkler, dry-pipe sprinkler and pre-action sprinkler systems with fusible heads are provided within the plant as indicated in the Fire Hazards Analysis Report. The wet-pipe sprinkler and dry pipe sprinkler systems are activated by melting of the fusible element due to sufficiently high ambient temperature. Automatic sprinkler systems protect the cable spreading rooms. Operation of a sprinkler system is signaled in the control room. The pre-action sprinklers include fixed temperature sensors. Upon sensing high ambient temperature, the manual pre-action systems signal the condition locally and in the control room so that an operator will know to investigate and determine whether or not to activate the system; the automatic pre-action systems are activated simultaneously with the signaling actions. The automatic pre-action systems may be manually operated. Localized high ambient temperatures melt the fusible element of sprinkler heads, so that the activated water flow will reach the areas on fire. All wet-pipe, dry-pipe, and pre-action sprinkler systems providing primary protection are designed and installed in accordance with NFPA 13. Also, all automatic sprinkler systems providing primary protection for redundant safe shutdown-related raceways have additional sprinkler heads located below obstructions such as ducts and cable trays. This configuration is shown in Figure 9.5-27. A piping and instrumentation diagram of the sprinkler systems is given in Figures 9.5-1 through 9.5-3 and 9.5-7 through 9.5-8a.

9.5.1.2.2.4 Deluge Spray Systems

Hydraulically designed deluge spray systems with open spray nozzles are provided within the plant. With the exception of HVAC charcoal filter train systems, fixed temperature heat sensors detect high ambient temperature and activate the system automatically. Alarms will also be given for this system independent of actuation of the suppression system. The HVAC

charcoal filter train systems can be manually activated after a high ambient temperature is detected by fixed temperature sensors and alarmed on the security and fire protection system console. Manual actuation of all deluge spray systems can be accomplished locally. Operation of a deluge spray system will alarm in the control room and locally. Water spray density is in accordance with NFPA 15. Deluge spray systems which protect engineered safety feature transformers

include a deluge valve installed outside of the area protected by the respective system. A piping and instrumentation diagram of the deluge spray water systems is presented in Figures 9.5-1 through 9.5-3 and 9.5-7 through 9.5-8a.

9.5.1.2.2.5 Gaseous Extinguishing Systems

Manual carbon dioxide, automatic carbon dioxide, or automatic Halon 1301 total flooding gaseous extinguishing systems are provided where water is not a feasible fire fighting agent due to the presence of non-waterproof electrical components. These areas are noted in the Fire Hazards Analysis Report. The manual carbon dioxide systems include rate compensated temperature sensors which, upon sensing a high rate of temperature rise or a high ambient temperature, alarm locally and in the control room so that an operator is alerted to investigate and determine whether or not to activate the system. Rate compensated heat detectors activate the automatic carbon dioxide systems and the automatic Halon 1301 system. Where required to maintain concentration, automatic controls close ventilation ductwork and doors, prior to discharge of the gaseous agent. For protection of equipment, several fan units are provided with interlocks which stop fan operation upon actuation of carbon dioxide and Halon 1301 systems. Carbon dioxide gas is stored in bulk quantity outdoors, separated from buildings. A carbon dioxide extinguishing system is designed to achieve a concentration of 30 volume percent within 2 minutes and a concentration of 50 volume percent within 7 minutes. A concentration of 30 volume percent will be maintained for not less than 20 minutes if enclosed rotating equipment is involved. Carbon dioxide storage capacity is sufficient to provide two actuations of the largest system.

Halon 1301 for the computer room systems is stored in pressurized bottles located outside, but adjacent to the room protected. Halon 1301 for the PGCC systems is stored in pressurized bottles located inside the end of the control cabinets in the control room and the control cabinet area (El. 190'). The pressurized Halon 1301 bottles are provided with safety pressure relief valves. The computer room Halon 1301 systems are designed to provide a concentration of 5 to 7 volume percent in 10 seconds and maintain a concentration of 5 volume percent for a soak time of 10 minutes. The PGCC Halon 1301 systems are designed to provide an initial concentration of 6 to 7 volume percent within 10 seconds and a final concentration greater than or equal to 20 volume percent for a soak time of 20 minutes.

Prior to the automatic discharge of Halon 1301 or carbon dioxide into a room, a pre-discharge alarm is sounded and a control room alarm is provided to alert personnel of system activation. The local alarm provides personnel in the room with adequate time to evacuate the area prior to system discharge. Controls of the Halon 1301 systems are provided locally in the computer room to abort the automatic discharge of Halon, if necessary. Lockout switches are provided for the carbon dioxide systems covering the upper and lower cable spreading rooms and the remote shutdown panel rooms to prevent inadvertent actuation while these areas are occupied. The alarms in the control room, which indicate operation of any automatic gaseous fire suppression system, are initiated by control devices located outside of the respective fire area, except for the BOP computer room.

For purposes of detection, alarm, and suppression within the control room, the control room Halon fire protection system is divided into fire protection zones. A fire protection zone provides fire detection, alarm, and suppression independently for each PGCC panel module.

A piping and instrumentation diagram of the gaseous extinguishing systems is presented in Figures 9.5-5 and 9.5-6.

9.5.1.2.2.6 Hydrogen Detection

Hydrogen gas concentration detectors are included to sample the atmosphere in each battery room in the control building. The battery room hydrogen gas detector units continuously monitor ambient air, and upon detecting a hydrogen gas concentration of 2 percent or more, the units signal in the control

room. Hydrogen gas detector units are also provided for the hydrogen offgas system and containment drywell. These units also signal a high hydrogen concentration in the control room.

9.5.1.2.2.7 Smoke and Flame Detection

Ionization smoke detectors and ultraviolet flame detectors are located as indicated in the Fire Hazards Analysis Report. The smoke and flame detectors provide early warning capability to permit prompt action by the onsite fire brigade. The smoke and flame detectors signal in the control room and locally, but do not activate fire protection equipment except for the sliding fire door located between the remote shutdown panel rooms. The smoke detectors in the remote shutdown panel rooms activate an electrothermal link, thereby shutting the automatic fire door between the two divided panels. Several detectors are connected to each zone module; a signal from a detector identifies the respective zone. Proper functioning of each detector circuit is continuously monitored; malfunction is annunciated.

Area coverage by ionization smoke detectors or ultraviolet flame detectors is provided in all areas of seismic Category I structures that contain or present an exposure fire hazard to safe shutdown or safety-related systems or components. Non-seismic Category I structures do not contain any equipment required for safe shutdown. The minimal amount of safety-related equipment located in non-seismic Category I buildings (the turbine, water treatment, and radwaste buildings) is designed to fail safe or to fail in a manner that does not compromise any required safety functions.

Activation of one or more detectors results in the following:

a. Visual indication at each signalling detector in the form of an integral light.

b. Local audible annunciation by means of fire bells.

c. Visual and audible alarms at the local smoke detection panel.

d. Visual and audible annunciation in the control room through the security and fire protection system monitoring console. In addition, the area where the signalling detector is located is identified through a CRT display in the control room.

9.5.1.2.2.8 Manual Fire Alarms

Pull-type alarms are manually activated by personnel and signal locally and in the control room. The alarms are divided into the same zones as the detectors; the signal from an alarm identifies the respective zone in the control room.

9.5.1.2.2.9 Fire Barriers

Fire walls and fire barriers are provided as indicated in the Fire Hazards Analysis Report. Fire-rated penetration seals are provided, as necessary, to maintain the integrity of fire walls. Fire barriers are capable of containing the effects of possible fires for the minimum amount of time for which the barrier is rated. Fire breaks are located in vertical electrical cable raceways, not more than 20 feet apart, to prevent the spread of a possible fire by means of electrical cable.

In safety-related or high hazard areas, floor and ceiling structures and supports designated as rated fire barriers are composed of normal weight concrete over galvanized metal decking formwork. Minimum slab thickness is 4-1/2 inches for a 2-hour rated fire barrier and 5-1/4 inches for a 3-hour rated fire barrier; this is in accordance with UL design numbers D902 and D916. Moreover, in the areas noted above, the fire rated walls are constructed in accordance with the Standard Building Code and UL design numbers U904 and U905.

All electrical, piping, tubing, and duct penetrations through fire rated floors and walls are filled to a depth which meets the thicknesses verified by actual fire tests which were witnessed and certified by an independent fire testing agency. Fire barrier closures are designed to withstand a 3-hour fire and are tested in accordance with American Nuclear Insurers and Mutual Atomic Energy Reinsurance Pool standards.

During the cable penetration tests, cables were tied to the cable trays with the same ties that are used in Grand Gulf. An assortment of ties were used so that flexibility in procurement would be guaranteed. The cable tray supports utilized for the test were external to the test furnace being mounted on the unexposed side of the test slabs. This mounting simulated actual field installations in that the exposed sections of tray would be held in place during an actual fire by the unexposed sections of the tray system.

Concrete joint sealers and fillers were subjected to 3-hour fire and hose-stream tests in accordance with the ASTM E 119 test setup. The tests were performed by an independent laboratory using materials and construction details representative of those used at Grand Gulf. Figure 9.5-28 shows the concrete slab detail used with four joints completely penetrating the

slab. One side of the slab was exposed to a 3-hour fire in accordance with ASTM E 119. Temperature rise on the unexposed surface was within the requirements of ANI. No flame-through occurred, and no water penetrated the joints during the hose-stream tests; therefore, all ANI requirements were satisfied.

Structural steel required for the support of floor/ceiling fire barriers in safety-related buildings is protected to provide compliance with UL design numbers N711, N712, and D717. The referenced UL design numbers N711, N712, and D717 provide equivalent protection to UL design numbers 903 and 916.

9.5.1.2.2.10 Portable Extinguishers

Portable fire extinguishers are strategically located throughout the plant, as indicated in the Fire Hazards Analysis Report. Portable fire extinguishers are selected for an area after an evaluation of the type of combustibles present, in order to properly match the type of extinguisher to the service required. Water extinguishers are strategically located for use in spaces which contain safe shutdown-related equipment.

9.5.1.2.2.11 Breathing Apparatus

Portable breathing apparatus and required appurtenances are available to be issued to the fire brigade. The breathing apparatus are available for the fire fighters when fighting fires in smoke filled areas or in areas where a fire might cause substances to release dangerous gases and vapors.

9.5.1.2.2.12 Ventilation

Recirculating ventilation systems are designed to prevent spreading smoke and heat throughout the plant. Manual exhaust ventilation systems are available to remove smoke and heat.

As described in the Fire Hazards Analysis Report and subsection 9.5.1.2.2.7, ultraviolet flame detectors provide detection capabilities in each diesel generator bay and initiate alarms in the control room and locally. The alarms provided in the control room identify the location of the detected fire.

Administrative procedures have been implemented at Grand Gulf to require that, as part of the operator action, the control room operators start the outside air fans in the other two diesel generator bays. During normal plant operation, with the diesels shut down, temperature control within each generator bay is provided by a recirculation cooling system utilizing a fan coil unit with no air makeup or exhaust. Therefore, it is unlikely that any significant communication between generator bays would occur before the fire would be detected and the supply air fans in the unaffected bays could be started. If the fire were to occur during operation of the affected standby diesel generator, causing either a manual or automatic shutdown of that diesel generator, the fan in the bay housing the redundant standby diesel generator would automatically start when the diesel generator starts.

Portable smoke ejection fans dedicated for use in removing smoke, hot air, and dangerous gases, and providing proper ventilation, have been provided for use by the plant fire brigade. The portable smoke ejectors are rated at 5000 c.f.m. and are powered by a 115 V ac, 60 cycle, explosion proof motor. Portable emergency generators have been provided to enable the usage of the portable smoke ejectors when offsite power is not available. These units are strategically located along with similar fire fighting equipment throughout the plant to facilitate quick and easy access by fire brigade members. Portable ducting, compatible for use with the emergency smoke ejectors, is also provided to enable removal of smoke and combustion products through a desired channel to the outside atmosphere.

9.5.1.2.2.13 Power Supply

The fire protection and smoke detection systems are powered from several different types of plant distribution systems. These consist of: non-Class IE ac distribution (Note: the PGCC halon system is fed from non-Class IE ac distribution along with a fire control panel backup battery system), non-Class IE uninterruptible ac distribution (UPS), 125 V dc station batteries, and Class IE associated power supplies.

The non-Class IE power distribution system includes the 480 V load centers, MCCs, and 120 V power panels utilized for plant operation. The Class IE associated power supply includes 480 V MCC.

The non-Class IE 120 V ac uninterruptible power is provided from 30 KVA inverters which are fed from non-Class IE batteries K and L. The chargers for these batteries are powered from Class IE load centers. There is an alternative ac feed directly from Class IE associated power in the event of inverter failure.

The dc control power is provided directly from non-Class IE dc distribution panels fed from batteries D and E. The chargers for these batteries are powered from Class IE load centers.

Non-Class IE chargers will be powered by the diesel generators in case of loss of offsite power. In this case, the above battery feed systems will be available for a time period in excess of the normal 2-hour battery capacity.

Power will be available to all fire protection/detection loads in all postulated fire situations, except for the electric fire pumps. These pumps are backed up by diesel-driven fire pumps, which will ensure adequate response to the hydraulic demands of the fire protection system in case of loss of power to electric fire pumps.

The primary power supply for the fire alarm system is via an inverter feed from the station's non-Class 1E battery system. Under normal operating conditions, the battery loads are supplied by two 100 percent capacity battery chargers which are in turn powered from the Class 1E AC distribution system. In the unlikely event of a total failure of this battery charger-battery-inverter combination, an automatic transfer switch will connect the power feeder to a Unit 1 Class IE transformer when Unit 2 is under construction and to a Unit 2 inverter after Unit 2 is operational. Provision has also been made to allow a manual transfer (via a permanently installed transfer switch) to the alternate Class IE AC source for maintenance purposes. Power will thus be available to the alarm system at all times with a possible exception during a LOCA. In case the system is being fed from the Unit 1 Class IE source (an alternate power supply while Unit 2 is under construction) and a LOCA signal occurs, the fire alarm system would be automatically shed from the Class IE supply. For this to occur, however, the situation would be that the normal inverter-battery-battery charger combination fails concurrent with a LOCA (while Unit 2 is under construction). Since fires are not postulated concurrent with a LOCA and since, even then, it would take a second failure to jeopardize the system power, power to the fire alarm system will be available for all postulated fire situations.

Amend.

9.5.1.3 Safety Evaluation

The Grand Gulf fire protection program (including the fire protection systems design) is generally based on compliance with the positions of Appendix A to NRC Branch Technical Position (BTP) APCSB 9.5-1, dated August 23, 1976 (for plants under construction before July 1, 1976). A point-by-point comparison of the Grand Gulf fire protection program and the positions of Appendix A to BTP APCSB 9.5-1 is presented in Table 9.5-11. An earlier preoperational fire hazards analysis (previously presented in Appendix 9A to this FSAR) was performed to substantiate the stated compliance and to demonstrate a level of fire protection sufficient to ensure that no single postulated fire would prevent the plant from being safely shut down.

On October 27, 1980, the NRC approved a new rule concerning fire protection as applied to nuclear power plants. This rule and its Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," established the minimum acceptable fire protection requirements necessary to resolve certain areas of concern to the NRC staff and licensees of plants operating prior to January 1, 1979. A point-by-point comparison of the Grand Gulf fire protection program and the requirements of 10 CFR 50, Appendix R Sections II and III, is presented in Table 9.5-12.

As noted in the Safety Evaluation Report (NUREG-0831), the NRC Staff concluded, based on evaluation of the fire protection program and MP&L commitments, that the fire protection program: 1) meets the applicable guidelines of the BTP, and 2) meets the intent of Appendix R.

To support the latter conclusion and to provide a fully documented review, MP&L undertook an Appendix R evaluation effort which more specifically addressed compliance with Appendix R requirements. This effort resulted in a new Fire Hazards Analysis Report, which has been submitted to the NRC under separate cover, and is maintained as a separately controlled plant document. This Fire Hazards Analysis Report summarizes an extensive safe shutdown analysis and evaluation of fire areas (as defined by Appendix R) containing safety-related equipment and concludes that no single fire will prevent the plant from being safely shut down and maintained in a safe shutdown condition. It shows that the Grand Gulf fire protection program still meets the guidelines of Appendix A to BTP APCSB 9.5-1 and also meets the intent of Appendix R.

In the course of developing the Fire Hazards Analysis Report, with its more specific definition of equipment required for safe shutdown, safe shutdown methodology was closely scrutinized and the required safe shutdown systems list stated in the preoperational fire hazards analysis was refined to accurately reflect the minimum combination of systems (and components) necessary to shut down the plant and to maintain the plant in a safe shutdown condition. The resultant systems (and components) are those required to maintain water level in the reactor pressure vessel (RPV) following an isolation/scram, depressurize the RPV by discharging steam to the suppression pool, cool the suppression pool, cool the RPV once it is depressurized, and the associated systems to maintain these functions.

These safe shutdown systems provide dual shutdown paths so that the reactor can be depressurized by the main steam/safety relief valves and water level maintained with low pressure ECCS, and also provide dual reactor cooling paths using the alternate shutdown mode of RHR. These minimum required systems are as follows:

- Nuclear Boiler System (Main Steam Safety Relief Valves - minimum of three valves, which can be operated from the remote shutdown panel, must remain functional).
- Residual Heat Removal Systems A and B: Suppression Pool Cooling, Alternate Shutdown Cooling, and LPCI Modes.
- Standby Service Water Systems A and B
- Standby Diesel Generators A and B
- ECCS Rooms HVAC
- ESF Switchgear HVAC
- Standby Service Water Pump House HVAC
- Diesel Generator Rooms HVAC
- Remote Shutdown Panel System
- Portions of electrical distribution systems L11, L21, L51, R20, and R21 required to support the above systems.

Amend.

Also required for safe shutdown is various instrumentation to monitor the plant response, and portions of the Reactor Protection System and Control Rod Drive hydraulic system. Furthermore, to ensure that an exposure fire will not increase the probability of a loss of coolant accident, cables related to certain valves which constitute high/low pressure interfaces are also considered safe shutdown related. A detailed definition of all required systems, components, and devices is provided in the Fire Hazards Analysis Report and its supporting documentation. Attendant bases, criteria, and scope are also defined in the Fire Hazards Analysis Report, followed by a zone by zone review of safe shutdown equipment, in-situ and transient combustibles, separation distances and fire barriers, and fire detection and suppression capabilities.

9.5.1.4 Inspection and Testing Requirements

Inspection and testing of fire protection systems and components prior to placement in service is discussed in Table

9.5-11, section C. Inspection and testing after systems and components are in operation, are discussed in Table 9.5-11, section C, and in Appendix 9B.

9.5.1.5 Personnel Qualification and Training

Qualification and training of personnel are discussed in Table 9.5-11, subsection B, and Sections 9B.3 and 9B.10 of Appendix 9B.

TABLE 9.5-11

FIRE PROTECTION PROGRAM COMPARISON
WITH NRC REQUIREMENTS

Point-by-point comparison of the fire protection program of the Grand Gulf Nuclear Station Units 1 and 2, with the positions of the Nuclear Regulatory Commission's Appendix A to Branch Technical Position APCSB 9.5-1, dated August 23, 1976, for plants under construction before July 1, 1976.

	Appendix A Position	Grand Gulf Station Position
A.	Overall Requirements of Nuclear Plant Fire Protection Program	
1.	Personnel	Comply. See the Fire Protection Program (Appendix 9B) and the Fire Hazards Analysis Report.
	a. Layout Coordination and System Design Requirements	See Appendix 9B.
	b. Design and Maintenance	See Appendix 9B.
	c. Fire Prevention Activities	See Appendix 9B.
	d. Fire Brigade Training	See Appendix 9B.
2.	Design Basis	Comply. Fire hazard analysis results were used to improve existing designs, as practicable.
3.	Backup	Comply. Hose streams and portable fire extinguishers are provided throughout the plant.
4.	Single Failure Criterion	Comply. Redundant fire pumps, piping, and fire suppression means are provided. The diesel generator building has a single supply for sprinkler systems and hose stations. However, fire hydrants are available in the vicinity.
5.	Fire Suppression Systems	Comply. Inadvertent operation of the fire suppression systems presents no safe shutdown problem.
6.	Fuel Storage Areas	Comply. Fire protection programs will be operative before receiving fuel.

Amend.

TABLE 9.5-11 (Cont.)

7.	Fuel Loading	Comply. Fire protection programs will be operative before fuel load.
8.	Multiple-Reactor Sites	Comply. Operative Unit 1 will be protected from hazards in Unit 2 while Unit 2 is under construction.
9.	Simultaneous Fires	Comply. Possible fires are postulated as presented in the Fire Hazards Analysis Report.
B.	Administrative Procedures, Controls, and Fire Brigade	
1.	Providing Administrative Procedures	Comply. See Fire Protection Program (Appendix 9B).
2.	Bulk Storage of Combustibles	Comply. See Fire Protection Program (Appendix 9B).
3.	Special Actions and Procedures	Comply. The Fire Protection Program procedures provide for these items: Fire protection organization Fire protection equipment maintenance Cutting, welding, and hot work following inspection for combustibles Coordination of fire protection during operation/construction period Fire protection test Impairment procedure Fire brigade Control of combustibles
4.	Public Fire Department Response	Comply. See Fire Protection Program (Appendix 9B).
5.	Fire Brigade	Comply. See Fire Protection Program (Appendix 9B).
	a. Equipment Testing and Maintenance	Provisions are described in Appendix 9B.
	b. Basic Training	Comply. See Fire Protection Program (Appendix 9B).

TABLE 9.5-11 (Cont.)

	c. Proper Shift Coverage	Comply. See Fire Protection Program (Appendix 9B).
	d. Recommended Standard (NFPA 27)	Provisions have been made for: Organization, training, fire drills, inspection, maintenance, and courses in fire protection in the Fire Protection Program (Appendix 9B). Courses in fire protection - Fire Brigade Procedure
C.	Fire Protection Quality Assurance Program	
C.1	Design, Procurement, and Construction Phase	The Quality Assurance Program for fire protection during the design, procurement, and construction phases is controlled by Engineering, Procurement, Construction, Checkout and Turnover, and Quality Assurance department procedures. Some of these procedures are similar to those used for safety-related activities and some are written to address non-safety-related activities and are part of existing project manuals previously reviewed by Quality Assurance. Verification of the effectiveness of the Quality Assurance Program for fire protection is accomplished through design document review, inspections, surveillance and monitoring, tests, and audits. Systems, components, and structures covered by the program are: 1. Automatic pre-action sprinklers 2. Automatic wet-pipe sprinklers 3. Water spray systems

TABLE 9.5-11 (Cont.)

4. Automatic carbon dioxide systems

5. Halon 1301 systems

6. Standpipes

7. Fire and smoke detection and alarm systems

8. Fire doors and fire dampers

9. Fire walls

10. Penetration seals

11. Fireproofing of structural steel

12. Fire water pump house components

The quality assurance criteria that apply to fire protection during the design, procurement, and construction phases are described as follows:

1. Design Control and Procurement Control

a. Review and Approval

Several levels of design review and approval are applied to the design aspects of the Grand Gulf fire protection system. Applicable standard procedures of the Project Engineering Procedures Manual are utilized during initial design and during the performance of any design changes. These procedures include:

(1) Checking and review by design and engineering level personnel within the project engineering team having technical qualifications comparable to

TABLE 9.5-11 (Cont.)

those of the engineer or designer who originated the work.

(2) Review and approval by the originating engineering discipline.

(3) Review and approval by the Project Engineer or the cognizant Assistant Project Engineer.

In addition to the reviews performed by Project Engineering, a staff fire protection specialist is consulted by the design engineer, as necessary, to ensure design adequacy.

Technical aspects of the procurement documents are also prepared by Project Engineering in accordance with the above procedures. Technical changes in procurement documents are subject to the same degree of design control as was exercised in the preparation of the original document.

b. Codes and Standards

Codes, standards, and guidelines which control the design, materials, fabrication, installation, and testing of fire protection systems and components are specified in the applicable design documents and in the engineering specifications for procurement of systems and components. Conformance with the applicable codes and standards is ensured by standard document reviews, as described in Part a, and vendor certification provided with the shipment. Deviations

TABLE 9.5-11 (Cont.)

from specified codes and standards are documented and reviewed by Project Engineering. Deviations or changes from applicable standards dispositioned "use-as-is" must be justified and approved. The justification and approval shall also be documented and filed.

c. New Designs and Plant Modifications

New designs and plant modifications to the fire protection systems which may affect fire protection capabilities are subjected to the standard review procedures described in Part a. These reviews specifically include the following:

(1) Wiring isolation and cable separation are reviewed for compliance with Regulatory Guide 1.75, as specified in Appendix 3A.

(2) Safe shutdown cable routings are reviewed for impact on the safe shutdown analysis described in the Fire Hazards Analysis Report to ensure that adequate protection is provided against the effects of exposure fires on redundant safe shutdown-related components.

(3) During the design and construction phase, isolation of new or modified rooms by the use of fire-rated barriers (walls, floors, ceilings, penetrations, and doors) is determined by Project

TABLE 9.5-11 (Cont.)

Engineering. Any deviations from design that occur during construction are permanently documented in accordance with standard procedures. The level of review provided for deviations or modifications of fire-rated barriers is the same as required for the initial design. Barrier requirements are summarized in the Fire Hazards Analysis Report.

d. Review and Concurrence in Fire Protection Requirements and Quality Adequacy in Procurement Documents

Procurement documents are reviewed as described in Part a. Additional review of specifications is performed by the Bechtel Quality Engineering organization to verify that quality requirements are correctly stated, inspectable, and controllable, and that there are adequate acceptance and rejection criteria.

Field Engineering procedures provide instructions for control of construction activities including:

(1) Receipt and control of Project Engineering design documents

(2) Field Engineering detail design work including field change requests

(3) Incorporation of design changes including field change requests

TABLE 9.5-11 (Cont.)

	(4) Review of supplier and contractor drawings as delegated by Project Engineering.
2. Instructions, Procedures, and Drawings	The written instructions and procedures used to implement the Bechtel Quality Assurance Program for fire protection and the activities affecting quality during the engineering, procurement, and construction phases of the project are contained in the following manuals and documents: a. Quality Assurance Department Procedures Manual (QADPM), which defines responsibilities and outlines quality assurance activities. b. Project Engineering Procedures Manual (PEPM), which contains procedures for operation and control of the Engineering Department. c. Procurement Supplier Quality Department Manual (PSQDM), which contains source inspection instructions, guidelines, and procedures. d. Construction Work Plan Procedures Manual (WP/P), which contains procedures for operation and control of the Construction Department as of October 1, 1975. Inspections, tests, and administrative controls are accomplished in the following manner: (1) Requirements for instructions, procedures, and drawings are defined in the Work Plan/Procedures Program. Contractor and

Amend.

TABLE 9.5-11 (Cont.)

supplier activities are accomplished in accordance with Project Engineering approved drawings and specifications, with monitoring and surveillance by the Bechtel Contracts Administration Department.

(2) The installation or application of penetration seals and fire-retardant coatings is performed in accordance with the Work Plan/Procedures Program for Bechtel and Project Engineering approved drawings and details for contractors.

e. Checkout and Turnover Organization Manual (CTOM), which contains procedures and guidance for preparing test procedures and performing system and component tests.

Written, formal instruction from Project Engineering to suppliers and contractors is in the form of engineering specifications, drawings, and drawing change notices. These documents contain, reference, or require procedures and instructions, as appropriate, and provide necessary acceptance criteria. These documents, when approved by Project Engineering, provide authorization for construction work.

The sequence of actions for preparation, review, and control of instructions, procedures, and drawings depends upon the type of instructions, procedures, or drawings and is described in the appropriate manuals.

TABLE 9.5-11 (Cont.)

For example, the sequence of actions governing preparation, review, and control of drawings prepared by Project Engineering personnel is described by procedures contained in the Project Engineering Procedures Manual. Also, review and control of vendor drawings is described in the same manual, although the sequence of actions for preparation, review, and control of these drawings is different. The sequence of actions described in the Bechtel procedures provides for specified drawings, procedures, and instructions to be reviewed and approved by the responsible design discipline. The sequence of actions is subject, when applicable, to review and concurrence by interfacing disciplines at the cognizant design engineering level, and by off-project specialists, as required.

Similarly, the sequence of actions for preparation, review, and control of various instructions and procedures, including those applicable to the fire protection systems, fire retardant coatings, and the installation of penetration seals, are described in the applicable manual. Such procedures are reviewed and concurred with by interfacing departments and disciplines, where required.

Appropriate acceptance criteria, both quantitative and qualitative, are described in the applicable instructions, procedures, or drawings. This requirement is defined in department procedures and applies to instructions, procedures, and drawings prepared by Bechtel Project Engineering or by suppliers.

TABLE 9.5-11 (Cont.)

	Bechtel procurement documents require suppliers and contractors to submit specified drawings and procedures to Bechtel for approval prior to start of fabrication or construction. Bechtel review of these documents is performed to determine that interfacing design features are compatible with overall design and installation requirements, and that procedures are acceptable. Verification that work is accomplished in accordance with approved instructions, procedures, and drawings is obtained through the various levels of surveillance, inspection, and audit.
3. Control of Purchased Material, Equipment, and Services	The Bechtel Fire Protection Quality Assurance Program includes a comprehensive system to ensure that purchased material, equipment, and services conform to the procurement documents. This system is described below. a. The Bechtel Procurement Department maintains a current list of bidders acceptable to the Corporation. The list is reviewed periodically to verify the adequacy of each vendor for specific services, materials, or equipment. Note: Suppliers for the fire protection system may not have been chosen from this list of bidders, as it is only mandatory for safety-related equipment. Due to the importance of fire protection equipment, nationally recognized suppliers may have been chosen by Project Engineering to supply equipment used. b. Source inspection has been provided for major CO_2 system components and the fire pumps.

TABLE 9.5-11 (Cont.)

		The Grand Gulf fire protection design incorporates standard, commercially available equipment and materials which are verified by receipt inspection and, in addition, are subjected to site testing.
	c.	The purchase order or subcontract contains the requirements for engineering and quality verification documentation to be submitted by the seller. Drawings and/or documents may be required to be submitted to Project Engineering for review only or for approval prior to proceeding with the work. Drawings and/or documents are specified for "review only" or "prior approval required" commensurate with the complexity of the equipment involved. Drawings and documents are reviewed for interface information and for compliance to requirements of the purchase order or subcontract.
	d.	Receiving inspections and related documentation requirements are established by the Project Engineering specifications, and implementation is defined in the Work Plan/ Procedures Program.
4. Inspection	a.	Fire protection systems and components are inspected and tested during and after installation to ensure conformance with design requirements. Appropriate records are maintained which document the tests and inspections.
	b.	Items such as emergency lighting, communciation equipment, penetration seals, fire-rated

TABLE 9.5-11 (Cont.)

	barriers, fire-retardant applications, and electrical cable routing are inspected to ensure proper installation.
	c. All cable and wire installations and modifications will be processed in accordance with Regulatory Guide 1.75, as specified in Appendix 3A. During the design and construction phase, compliance with this requirement will be verified by routine inspection of drawings by the electrical engineering discipline, augmented by site inspections as necessary.
	d. Inspections and approvals are by Bechtel, American Nuclear Insurers (ANI), and Middle South Services Risk Control consultants, not by the equipment supplier.
	e. Bechtel installations, inspections, and verifications are performed by Field Engineering in accordance with the Work Plan/Procedure Program. Contractor installations, inspections, and verifications are performed by the contractor in accordance with the requirements of Project Engineering specifications and Project Engineering approved design drawings and are monitored by Field Contracts Administration Department personnel.
5. Test and Test Control	Installation testing is accomplished as follows:
	a. Installations completed by Bechtel are tested in accordance with procedures contained

TABLE 9.5-11 (Cont.)

and approved in the Construction Work Plan/Procedures Manual and Project Engineering specifications.

b. Installations completed by contractors are tested in accordance with procedures approved by Project Engineering and in accordance with the requirements of the Project Engineering specification.

c. Completed installations are tested by the Checkout and Turnover Organization (CTO) or the contractor (at the direction of MP&L) to demonstrate the functional reliability of the installation in accordance with CTO procedures or the Project Engineering approved contractor procedures as applicable. Qualifications of personnel performing these tests are controlled by the Checkout and Turnover Organization Manual or the contractor manual.

d. Vendor test results are documented and evaluated by Project Engineering, Middle South Services Risk Control consultants, and ANI. Installation tests performed in the field are evaluated by the Bechtel Checkout and Turnover Organization in accordance with the applicable technical requirements established and documented by Project Engineering. Test results are retained as part of the permanent plant documentation.

TABLE 9.5-11 (Cont.)

6. Inspection, Test, and Operating Status	Inspection, test, and operating status are identified as follows: a. Inspection status is controlled through initiated documentation. b. Test status is provided for as follows: (1) Construction tests are performed in accordance with procedures or instructions, and appropriate tags are placed on the hardware as required by the Construction Work Plan/Procedures Program. (2) CTO tests are performed in accordance with CTO procedures, and appropriate tags are placed on the hardware as required by the CTO manual.
7. Nonconforming Items	a. The Bechtel Quality Assurance Program provides measures which control materials, parts, or components not conforming to prescribed requirements in order to prevent their inadvertent use or installation. Bechtel field procedures and practices incorporate measures for material control, including identification and/or segregation of nonconforming items. b. The identification, documentation, segregation, review, disposition, and notification to the affected organization of nonconforming materials, parts, components, or services are procedurally controlled by the WP/P and the Project Engineering Procedures Manual.

TABLE 9.5-11 (Cont.)

	c. For nonconforming items that may be made usable through rework or repair, or that can be used "as is," reports are prepared for resolution and approval unless repair or rework can be accomplished by use of prior-approved procedures. Nonconformance reviews and dispositions are performed in accordance with the project procedures, and records of documentation and resolution are retained in permanent plant document files.
8. Corrective Action	a. The Bechtel Quality Assurance Program applied to fire protection requires implementation of a corrective action program. This includes reporting of significant deficiencies, malfunctions, deviations, defective material, etc. that cannot be resolved at the site and/or require management attention, and that may necessitate changes in program procedures or practices. Routine occurrences or rework generally anticipated for the activity involved are not normally included in the corrective action program.
	b. Measures are established in the Construction Work Plan/Procedures Program that provide for the identification and disposition of conditions adverse to quality. Condition Reports (CR), Deficiency Reports (DR), and Nonconformance Reports (NCR) are used to identify situations which are not acceptable in accordance with design documents. They contain the tools for tracking and identifying corrective action to return the condition to

TABLE 9.5-11 (Cont.)

	conformance. These documents are reviewed by Project Engineering when the disposition is "use-as-is" or "repair."
9. Records	a. Records required by instructions, procedures, and drawings are kept to furnish documentary evidence of quality-related activities such as inspection results, audits, nonconforming items, corrective actions, construction, maintenance, modifications, and manufacturers' data. Records are identifiable and retrievable as required by procedures.
	b. These records are available for audit by MP&L and regulatory agencies during the design, procurement, and construction phases of the project. The project will maintain these records in compliance with Bechtel practices regarding retention, location, duration, and responsibility until they are turned over to the project.
10. Audits	Project Quality Assurance performs monitoring and audits of fire protection activities to the degree and frequency necessary to assure conformance to governing functional procedures. As a minimum, fire protection activities covered by the program will be audited once per year, or once during the life of the work activity, to assure conformance with governing procedures, specifications, and standards. Periodic monitoring activities shall be conducted on an unscheduled basis as deemed necessary by Quality Assurance.

TABLE 9.5-11 (Cont.)

	Monitoring and auditing shall be conducted in accordance with Quality Assurance department procedures. Audits shall be performed on a scheduled basis to cover all facets of the Quality Assurance Program described herein.
C.2 Startup Testing and Operational Phases	Upon turnover of a fire protection partial from the Bechtel Checkout and Turnover Organization (CTO) to the MP&L Startup Organization, the Fire Protection QA Program came under the management control of the MP&L QA organization. The scope of authority and responsibilities associated with this control are defined in Policy 1 of the MP&L Operational Quality Assurance Manual. The Fire Protection QA Program for GGNS Units 1 and 2 during these phases is described in the following Policies of the MP&L Operational Quality Assurance Manual (MPL-TOP-1A), as modified by Notes 1 through 4. 1. Policy 3 - Design Control 2. Policy 4 - Procurement Document Control 3. Policy 5 - Instructions, Procedures, and Drawings (See Note 1) 4. Policy 7 - Control of Purchased Material, Equipment and Services (See Note 2) 5. Policy 10 - Inspection 6. Policy 11 - Test Control 7. Policy 14 - Inspection, Test, and Operating Status

TABLE 9.5-11 (Cont.)

8. Policy 15 - Nonconforming Materials, Parts, and Components

9. Policy 16 - Corrective Action

10. Policy 17 - Quality Assurance Records

11. Policy 18 - Audits

12. (See Notes 3 and 4)

NOTES: 1.(a) In some situations where sufficient documentation is not available to allow the preparation of a detailed procedure prior to the activity being performed, the engineer may write the procedure as the work function (valve breakdown, etc.) takes place, and appropriate reviews and evaluations occur after the fact. The equipment/component will not be declared operable until the procedure has received the required reviews and approval.

(b) In some situations during work evaluation where sufficient documentation is not available to allow the preparation of a detailed procedure prior to the activity performed (i.e., first time work function is performed), craft Supervisors may prepare the procedure as the work function takes place, providing the procedure is submitted within five working days for appropriate reviews and evaluations. The equipment/component will not be declared operable until the procedure has received the required reviews and approval.

2.(a) The supplier of equipment and material does not have to have a ANSI N45.2 QA Program or be a qualified supplier under the MP&L QA Program. For such "commercial off-the-shelf" equipment and material, conformance to Procurement Documents will be ensured by one or more of the following: examination of items upon delivery (or prior to installation), inspection and audit at the source, or objective evidence of quality furnished by the supplier.

(b) Material/equipment will be replaced and maintained at equal to or better than original. Should the material/equipment be purchased as nonsafety-related, appropriate engineering procedures will require the engineer to specify material/equipment

TABLE 9.5-11 (Cont.)

to be used per the appropriate work document. Should the material/equipment not be an identical replacement, the engineer shall visually ensure that material/equipment is adequate and appropriately documented.

The appropriate engineering procedures which require the engineer to specify material/equipment are reviewed by a quality organization (Quality Assurance) who ensures that quality requirements are addressed. The engineer's implementation of the procedure is subject to periodic inspection or monitoring and periodic audit by Quality Assurance.

3. In general, the fire protection systems (as defined in Section C.1 of this table) in the following plant areas are included under the Operational Quality Assurance Program.

   1. Control Building Elevations 111', 133', 148', 166', and 189'

   2. Auxiliary Building (all elevations)

   3. Containment and Drywell (all elevations)

   4. Diesel Generator Building

   5. Standby Service Water Pump House

   6. Firewater Pump House components, which include the Diesel and Electric driven pumps and drivers, associated controls, and auxiliaries

4. The QA activities which apply to the Fire Protection System are under the management control of the MP&L QA organization. The specific organizations which exercise this control are quality assurance, nuclear plant engineering, plant technical support (engineering), maintenance, and operations.

   This is accomplished by plant technical support, maintenance, and operations implementing respective Fire Protection QA Program elements in accordance with procedures which address incorporation of suitable requirements (including QA). These procedures are reviewed by Quality Assurance for inclusion of applicable quality requirements. QA audits periodically to verify that plant technical

TABLE 9.5-11 (Cont.)

	support, maintenance, and operations functions are accomplished in accordance with procedures. The above provide confidence to management responsible for fire protection. QA verifies the effectiveness of the QA activities for fire protection through review, inspections monitoring, and audits. Nuclear Plant Engineering implements the design control element of the Fire Protection QA Program once the fire protection system is turned over to the plant maintenance and operations. This is accomplished in accordance with Nuclear Plant Engineering procedures which address incorporation of suitable requirements (including QA). These procedures are reviewed by Quality Assurance for inclusion of applicable quality requirements. Quality Assurance then monitors and periodically audits to verify that the Nuclear Plant Engineering functions are accomplished in accordance with these procedures.
D. General Guidelines for Plant Protection	
1. Building Design	
a(1) Isolate Non-Redundant Safety Systems from Hazards	Plant layout is arranged, as much as practical, to isolate safety-related systems from unacceptable fire hazards.
a(2) Separate Redundant Safety Systems	Plant layout is arranged, as much as practical, to separate redundant safety-related systems from each other so that both are not subject to damage from a single fire hazard. Redundant systems subject to damage from a single fire hazard are protected by a combination of fire barriers, fire detection, and suppression systems.
b. Fire Hazard Analysis	Comply. The Fire Hazards Analysis Report is a separate controlled plant document.
c. Cable Spreading Room	Separate cable spreading rooms are provided for Units 1 and 2 separated by 3-hour fire-rated barriers. Upper and lower cable spreading

TABLE 9.5-11 (Cont.)

		rooms are provided for each unit and are separated by 3-hour fire-rated barriers. Cable spreading rooms contain some redundant safe shutdown cables, and are protected as discussed in the Fire Hazards Analysis Report. Smoke detectors, an automatic double-shot total flooding carbon dioxide system, an automatic wet-pipe sprinkler system, and two hose stations with portable water and dry chemical fire extinguishers are provided for fire detection and suppression.
d.	Non-Combustibles	Comply. Interior wall and structural components, thermal insulation materials, radiation shielding materials, and soundproofing are noncombustible. Interior finishes in safety-related areas are non-combustible or listed by a nationally-recognized testing laboratory, such as Factory Mutual or Underwriters' Laboratory, Inc., for flame spread of 25 or less in its configuration per ASTM E-84 test. Materials not meeting the above are evaluated prior to use in the plant.
e.	Metal Deck Roofing	Comply. Metal deck roofing is non-combustible.
f.	Concealed Spaces	Suspended ceilings and supports are non-combustible. Concealed spaces are devoid of combustibles unless otherwise noted in the Fire Hazards Analysis Report. The security-alarmed door providing access to the concealed ceiling space above the control room is locked at all times with access controlled by the Shift Supervisor. Administrative controls for maintaining fire protection, discussed in Appendix 9B, subsection 9.B.4, will provide protection to this area and, specifically, no hot work

TABLE 9.5-11 (Cont.)

		will be allowed in the concealed space above the control room unless the plant is in cold shutdown.
g.	Indoor Dry Transformers	Comply. Indoor transformers are either dry type or cooled with non-combustible liquid.
h.	Transformer Oil Spill Hazard	Comply. Buildings containing safety-related systems are protected from exposure or spill fires involving outdoor oil-filled transformers by a combination of 2-hour barriers and automatic deluge systems.
i.	Floor Drains	Comply. Floor drains are sized to handle water flow from existing water sprinkler systems and hose streams.
j.	Three-Hour Fire Barriers	Penetrations and doors meet or exceed the fire rating of the respective fire barrier except as noted in the Fire Hazards Analysis Report. All concrete walls are reinforced and impervious to fire. Penetrations through non-rated fire barriers are not provided with fire rated penetration closures. Duct penetrations in fire-rated walls which are larger than 48 inches in any direction utilize two 1½-hour, UL-rated, curtain-type fire dampers in series, in accordance with NFPA 803-1978, Paragraph 7-3.2.3. Duct penetrations in fire-rated walls of sizes up to 48 in. x 48 in. utilize a single 3-hour UL-rated curtain-type fire damper. Duct penetrations in fire-rated floors utilize trap-door-type fire dampers. The fire doors carry a 3-hour UL label.

TABLE 9.5-11 (Cont.)

		Fire dampers are arranged to close automatically and to remain tightly closed upon the operation of a fusible link or an electrothermal link. Installation details for fire dampers in ventilation ducts are addressed in the Fire Hazards Analysis Report. Doors for installation in fire-resistive openings will meet the required rating. The UL label on the doors will indicate the approved fire test rating for the door. Where repairs or modifications are made that deviate from the tested configuration, an evaluation is performed to verify that the door's continued ability to meet its specified fire resistance rating is maintained. For further clarification of door ratings, see the Fire Hazards Analysis Report. For special doors, there is written certification that the doors meet UL label construction for specified fire ratings. Fire doors are controlled by administrative procedures and/or alarms supervised on the SFPS computer. All concrete joint seals are rated 3 hours as per ASTM E-119.
2.	Control of Combustibles	
a.	Isolation of Safety Systems from Combustibles	Comply. Consistent with the Fire Hazards Analysis Report, safety-related systems are separated or protected from combustibles to the extent practicable.
b.	Bulk Gas Storage	Comply. Bulk flammable gases are stored outdoors.
c.	Use of Plastic Materials	Comply. The use of plastic materials is minimal.

TABLE 9.5-11 (Cont.)

d.	Storage of Flammable Liquids	There are no flammable liquids stored in large quantities in the Seismic Category I structures. Actual quantities are taken into account in the Fire Hazards Analysis Report.
3.	Electrical Cable Construction, Cable Trays, and Cable Penetration	
a.	Non-Combustible Tray Construction	Comply. Cable tray materials are non-combustible.
b.	Cable Spreading Room	Refer to Section F.3
c.	Cable Water Spray Outside Spreading Room	Fixed suppression is provided where required, as discussed in the Fire Hazards Analysis Report. Cable construction is such as to allow water spraying of cable trays without faulting. The cable termination points do not require weatherproof terminal boxes or cabinets. Only equipment on fire will be wetted with hose streams by the trained fire brigade, and existing water sprinkler systems are located so as to avoid wetting electrical equipment within the buildings, except where installed to protect electrical equipment.
d.	Fire-Barrier Penetration	Consistent with the fire hazards analysis, fire barrier penetrations generally equal the fire rating of the respective barrier.
e.	Fire Breaks	Fire breaks or stops in cable trays are presently included in vertical runs, spaced every 20 ft or less, and in horizontal runs as deemed necessary by the fire hazards analysis.
f.	Cable Flame Test	With the exception of those cables listed in subsection 8.3.3.1, electrical cables in trays and conduits have been tested to

TABLE 9.5-11 (Cont.)

		certify compliance with IEEE No. 383 or ICEA S-19-81 flame retardance tests.
g.	Non-Toxic New Cable	Comply. To the extent practical, new cable installed will be constructed such that it will not give off corrosive gases while burning.
h.	Cable Tray Usage	Comply. No storage will be permitted on cable trays.
i.	Venting Cable Tunnels and Chases	Cable chases and tunnels can be manually ventilated, except as discussed in the Fire Hazards Analysis Report. Cable spreading rooms can be manually ventilated using the Control Building purge fan.
j.	Cables in Control Room	Cables entering the Control Room terminate there. Cables routed in underfloor trenches (PGCC) are protected in accordance with NEDO-10466-A. Halon protection is not provided in the concealed ceiling space above the Control Room, due to the absence of exposed combustibles.
4.	Ventilation	
a.	Venting Combustion Products Evaluation	Smoke removal from buildings containing safety-related equipment or potential sources of radioactivity is achieved as follows: 1. Drywell - Smoke removal from the drywell can be achieved by remote manual positioning of valves and dampers to utilize the containment cooling system charcoal filter trains in an exhaust mode. In this way, smoke can be exhausted at a rate of approximately 6,000 CFM, until such time as the filters become clogged. The radiation level of these exhaust gases is continuously monitored, and

TABLE 9.5-11 (Cont.)

upon detection of high radiation level, an alarm signals so that exhausting can be manually terminated if so desired.

2. Containment - Upon detection of smoke in the containment building, the air recirculation fans will automatically shutdown to limit the spread of smoke. Smoke can be exhausted by the containment ventilation exhaust fans at a rate of approximately 500 CFM, until such time as filters become clogged. Similarly, additional ventilation capacity of approximately 6,000 CFM is available by remote manual positioning of valves and dampers to utilize the containment cooling system charcoal filter trains in an exhaust mode. The radiation level of these gases is monitored continually, and upon detection of high radiation levels, an alarm signals so that the exhausting can be manually terminated if desired.

3. Auxiliary building - Upon detection of smoke in the auxiliary building, the air recirculation fans will automatically shut down to limit the spread of smoke. Smoke can be exhausted by the fuel handling area exhaust fans at a rate of approximately 12,000 cfm. Additional smoke venting is available by remote manual initiation of the fuel pool sweep exhaust fans; however, this would only serve the fuel pool area of the auxiliary building. Any smoke exhausted from the auxiliary building is monitored in the ductwork.

TABLE 9.5-11 (Cont.)

4. Control building - Upon detection of smoke in the control building, the air recirculation fans will automatically shut down to limit the spread of smoke. Smoke venting is available, by automatic and manual initiation of the control building purge fan, at a rate of approximately 8,000 cfm. This fan is capable of exhausting the upper and lower cable spreading rooms, the HVAC equipment area, and the main control room. Since no significant sources of radioactivity are present in the control building, these exhaust gases are not monitored for radioactivity levels.

5. Radwaste building - The radwaste building contains a minimal amount of safety-related equipment (all of which is designed to fail safe or in a manner that does not compromise any required safety or safe shutdown function); however, smoke removal is available at a rate of approximately 50,000 cfm, by using the radwaste building exhaust filter trains, until such time as the filters become clogged. Exhaust gases are continuously monitored for radioactivity, and an alarm is given to allow the venting to be manually terminated, if so desired.

6. Turbine building - The turbine building contains a minimal amount of safety-related equipment (all of which is designed to fail safe or in a manner that does not compromise any required safety or safe shutdown function). Upon detection of smoke in the

TABLE 9.5-11 (Cont.)

		turbine building, fans capable of recirculating smoke to other areas are automatically shut down. Smoke can be exhausted by utilizing the turbine building charcoal filter train and fans, at a rate of approximately 10,000 cfm, until such time as the filters become clogged. Should the filters become clogged, a manually controlled bypass is available to bypass the filters and allow smoke removal to continue. The exhaust gases are continuously monitored for radioactivity; an alarm is given to allow the venting to be manually terminated, if so desired. Smoke can be exhausted from the turbine building at a rate of approximately 19,000 cfm by manual initiation of the turbine building smoke exhaust fans. During this mode, the turbine building exhaust charcoal filter train and fans are shut down by a control interlock. Additional smoke venting in the turbine building is available through automatic roof hatches located above the operating floor. Heat and smoke vents are provided on a ratio of 1 to 100 sq. ft. of turbine building operating floor area.
b.	Failure or Inadvertent Operation of Ventilation Exhaust Systems	All safety-related ventilation exhaust systems include separate redundant components so that a single failure will not prevent safe shutdown of the reactor. Inadvertent operation of any exhaust ventilation system will merely exhaust to atmosphere. Such discharges are monitored for the drywell, containment, auxiliary, and radwaste buildings. Inadvertent operation of the turbine

TABLE 9.5-11 (Cont.)

		building smoke exhaust fans will result in unmonitored discharge; however, this is considered to be a remote possibility, and levels are expected to be low. There are no significant sources of radioactivity in the control building. Inadvertent operation of a recirculation ventilation system during a fire would possibly spread smoke into all areas served by the system. Spreading smoke will not prevent the operation of safety-related equipment but could cause the fire brigade visibility problems. To preclude this, recirculating ventilation systems are provided with smoke detectors which automatically shut down the fans.
c.	Ventilation Systems Power Supply	Power supply and control cables for ventilation systems are located in accordance with Regulatory Guide 1.75, as discussed in Appendix 3A. In addition, safety-related systems include redundant components.
d.	Charcoal Filter Fire Suppression	Comply. Charcoal filter trains located in the safety-related structures and within the scope of this report are protected in accordance with Regulatory Guide 1.52, as discussed in Appendix 3A. All charcoal filters except offgas adsorbers in the radwaste building are provided with manual deluge systems. The offgas adsorbers are equipped with 1½-inch hose connections.
e.	Separation of Supply and Exhaust	Comply. Supply and exhaust points are adequately separated.
f.	Stairwell Smoke Infiltration	Smoke infiltration in stairwells is minimized by normally closed fire doors installed at each level. Stairwells are enclosed by 2-hour fire rated construction.

TABLE 9.5-11 (Cont.)

g.	Smoke and Heat Venting Volume Flow for Cable Spreading Rooms, Diesel Fuel Oil Storage Area, and Switchgear Rooms	Comply. The minimum ventilation requirements are met or exceeded.
h.	Breathing Apparatus	Comply. Breathing apparatus and appurtenances are provided as required.
i.	Automatic Vent Closure for Gas Suppression System	Comply. Vents will close and ventilation will cease prior to firing gas fire suppression systems.
5.	Lighting and Communication	
a.	Fixed Lighting	The fixed emergency and essential lighting system consists of the following: 1. Essential (normal) AC lighting is installed in the control room, Class 1E switchgear rooms, emergency hot shutdown rooms, and Stair No. 0C02, between Elev. 111'-0" and 116'-0", in the Control Building. These lights are connected to Class 1E power supplies and are operated from the diesel generators upon loss of offsite power. 2. Emergency AC lighting in the control room is connected via inverters to the station Class 1E batteries which have a 4-hour minimum rating. 3. Individual DC lighting units are provided for general plant exit lighting. These units as purchased have a minimum rating of one-half hour. Special units with 8-hour lamp life are used in areas essential to safe shutdown and access/egress routes to these areas.

TABLE 9.5-11 (Cont.)

b.	Portable Lights	Comply. Portable lights are provided as required.
c.	Emergency Communication	Comply. Emergency communication is provided as required.
d.	Protection of Fixed Radio Repeaters	Comply. Fixed radio repeaters are protected from exposure fire damage.
E.	Fire Detection and Suppression	
1.	Fire Detection	
a.	System Compliance with NFPA 72 D	Functional requirements of NFPA72D-1975 are adhered to except that the wiring from the SFPS multiplexers to local control panels is Class B.
b.	Control Room and Local Alarm	Comply. Fire alarms annunciate in the Control Room and locally.
c.	Distinctive Fire Alarms	Comply. Fire alarms are distinctive and unique.
d.	System Connection to Emergency Power	The fire detection and protection system is independent of off-site power. The smoke detection system, computer room Halon system, CO_2 system and security and fire protection system (SFPS) multiplexers and computers are powered by 120 Vac which is supplied by inverters which in turn are connected to the non-IE station battery. The plant deluge systems are connected directly to the non-IE station battery which is kept charged by the battery chargers. Thus all of these systems are still powered upon loss of off-site pow CC Halon fire control panels d from 120 Vac power panels whi re lost on loss of off-site power. Each fire control panel is equipped with a battery standby power unit that will supply power

TABLE 9.5-11 (Cont.)

		in the event of primary power failure. The main CO_2 storage tank and supply valves are fed from a 480 Vac source which is connected to the IE supply and is shed only on a LOCA. Since fires are not postulated concurrent with a LOCA, this power is available for all postulated fire situations, including loss of off-site power.
2.	Fire Protection Water Supply Systems	
	a. Underground Yard Fire Main Loop	Comply. ANSI and AWWA standards are used. Lock-open valves with visual indicators are used. Service and sanitary water are separate.
	b. Cross Connection of Fire Main Loop	Comply. A common fire protection loop is utilized with sectional control.
	c. Water Capacity with Inactive Pump	Comply. Three fire water pumps are provided as described in FSAR subsection 9.5.1.2.1.
	d. Two Separate Reliable Water Supplies	Two 300,000 gallon tanks (maximum usable capacity - 291,358 gallons) are capable of supplying fire water to the largest demand deluge or sprinkler system (plus 500 gpm for manual hose streams) in a safety-related area of the plant for a 2-hour duration. Tank fill rates are discussed in FSAR subsection 9.5.1.2.1.
	e. Water Supply Basis	Comply. Two 300,000 gallon tanks (maximum usable capacity - 291,358 gallons) supply water (see FSAR subsection 9.5.1.2.1).
	f. Lake as Water Supply	Not Applicable.

TABLE 9.5-11 (Cont.)

g.	Outside Manual Hose Installation	Comply. Hydrants are approximately 250 ft apart. Curb valves and hose houses are provided for each hydrant, with appurtenances provided based on needs in each area.
3.	Water Sprinklers and Hose Standpipe Systems	
a.	Connections to Water Main	Both the primary and secondary fire-fighting water systems share the same header connections to the plant underground water main. However, a second independent connection tied to an interior loop with sectional control has been provided, or provisions have been made for other secondary supplies. Each sprinkler and standpipe system is equipped with an OS&Y gate valve. Each sprinkler system is provided with a water flow alarm. Water shields or baffles are provided to protect safety-related equipment where necessary.
b.	Valve Supervision	Comply. An adequate management supervision program is provided, including locking yard section valves with tamper-proof seals and periodic inspection. Valves for all of the sprinkler and deluge systems are provided with electrical supervision. Should the normal valve position change it will alarm, both visually and audibly, in the control room.
c.	Automatic Sprinkler System (NFPA 13 and 15)	Comply. Functional requirements of NFPA 13 and 15 are adhered to for primary systems.
d.	Interior Hose Installations	All interior locations, with the exception of the drywell, can be reached with at least one effective hose stream with no more than 100 feet of hose. More than 100 feet of hose is required to reach all areas of the drywell.

TABLE 9.5-11 (Cont.)

		Risers are 4 inch minimum with 2-1/2 inch minimum for a single hose.
	e. Hose Nozzles	All hose stations within the buildings, with the exception of the fire hose nozzles on elevation 208' in and out of the containment, include an adjustable nozzle from straight-stream to 90 degrees fog, with shutoff capability. The fire hose nozzles in and out of the containment on elevation 208' are straight-stream nozzles only. Fire brigade personnel are instructed in the proper application of hose streams to the various possible fire hazards.
	f. Use of Foam for Fire Protection	Not Applicable. No foam systems are utilized.
4.	Halon Suppression Systems	Comply. Functional requirements of NFPA 12A are adhered to.
5.	Carbon Dioxide Suppression Systems	Comply. Functional requirements of NFPA 12 are adhered to.
6.	Portable Extinguishers	Comply. Portable extinguishers are UL and FM listed and have been selected according to local fire hazards.
F.	Guidelines for Specific Plant Areas	
1.	Primary and Secondary Containment	
	a. Normal Operation	Comply. Fire protection is consistent with the results of the fire hazards analysis. Manual hose stations, smoke detectors, and portable extinguishers are provided to protect areas outside the drywell.
	b. Refueling and Maintenance	Comply. Hose stream, portable extinguishers, and breathing apparatus are provided.

TABLE 9.5-11 (Cont.)

2.	Control Room	A 3-hour fire barrier or the equivalent is provided around the Control Room Complex. Portable extinguishers (water and Halon) are provided in the Control Room and hose stations are located in adjacent areas. The PGCC is protected in accordance with NEDO 10466A. Ionization smoke detectors are provided in the Control Room and above the suspended ceiling. Ionization smoke detectors are also provided in the Control Room cabinets and under the floor with local alarms. Breathing apparatus for Control Room personnel are readily available. Ionization smoke detection is provided in the Control Room ventilation system which automatically alarms and initiates shutdown of the respective system. Manual venting of the Control Room is available. No fixed protection system is provided for the concealed space above the Control Room, due to the absence of exposed combustibles.
3.	Cable Spreading Room	Primary protection is provided by an automatic total flooding carbon dioxide suppression system. Backup protection is provided by manual hose streams, portable extinguishers, and automatic sprinklers. Upper and lower cable spreading rooms are provided for each unit and are separated from other areas by 3-hour rated fire barriers, except stairways and corridors having 2-hour barriers. Two remote entrances are provided for fire brigade access. Aisles are provided which facilitate access to all areas of the rooms. Smoke venting is provided for the rooms by the Control Building purge subsystem.

TABLE 9.5-11 (Cont.)

4.	Plant Computer Room	Comply. The plant computers are not safety-related; however, the room is isolated from the rest of the plant by 3-hr fire-rated barriers. Manual hose stations, ionization smoke detectors, and automatic Halon 1301 suppression systems are provided. Portable water and dry chemical fire extinguishers are available.
5.	Switchgear Rooms	Comply. Each room is isolated from the rest of the plant by 3-hr fire-rated barriers. Ionization smoke detectors, automatic CO_2 suppression systems, portable water and dry chemical fire extinguishers, and hose streams are provided.
6.	Remote Safety Related Panels	Comply. An automatic sliding fire door, ionization smoke detectors, automatic CO_2 suppression system, portable water and Halon extinguishers, hose streams, and 3-hr fire-rated barriers are provided to separate the panels of each division and from the remainder of the plant.
7.	Station Battery Rooms	Comply. Three-hour rated enclosures, adequate ventilation, ionization smoke detectors, and hydrogen detectors are provided.
8.	Turbine Lubrication and Control Oil Storage and Use Areas	Comply. Three-hour fire rated barriers and sprinkler systems are provided.
9.	Diesel Generator Areas	Comply. Three-hour fire rated areas, ultraviolet flame detectors, pre-action sprinklers, hose streams, and portable water and dry chemical fire extinguishers are provided.
10.	Diesel Fuel Oil Storage Areas	Comply. Diesel fuel oil storage tanks are buried outdoors.

TABLE 9.5-11 (Cont.)

11.	Safety-related Pumps	Safety-related pumps are protected in accordance with the Fire Hazards Analysis Report. Ionization smoke detection is provided.
12.	New Fuel Area	A minimal amount of combustibles are postulated in the new fuel and spent fuel pool area. These areas are locked and protected by 3-hr fire-rated walls, smoke detection, hose streams, and portable water and dry chemical fire extinguishers are provided. Entrance to these areas is controlled by administrative procedures to control introduction of transient combustibles. No additional fire protection is deemed necessary. The spent fuel pool is cooled by the FPC and CU pumps and heat exchangers; in addition, backup cooling capability is provided by RHR "A" and "B" systems.
13.	Spent Fuel Pool Area	
14.	Radwaste Building	Smoke detectors in the radwaste building are located strategically, but not throughout the building. Hose streams and portable extinguishers are provided. The radwaste building is separated from the rest of the power block by 3-hr fire rated barriers. Automatic sprinklers are provided for the hydraulic baler and oil separator.
15.	Decontamination Areas	Comply. The hot machine shop in the control building is protected by an automatic sprinkler system, hose streams, and portable water and dry chemical fire extinguishers. The ventilation system can be isolated as required.
16.	Safety-Related Water Tanks	Not applicable. Cooling tower basins store the necessary water.
17.	Cooling Towers	Comply. Non-combustible construction is used.

TABLE 9.5-11 (Cont.)

18.	Miscellaneous Areas	Comply. Safety-related equipment is isolated from these areas. See the Fire Hazards Analysis Report.
G.	Special Protection Guidelines	
1.	Welding and Cutting, Acetyleneoxygen Fuel Gas Systems	Comply. This equipment is controlled by an administrative procedure to include a permit system.
2.	Storage Areas for Dry Ion Exchange Resins	Storage of dry ion exchange resins is controlled by an administrative procedure to include a permit system.
3.	Hazardous Chemicals	Hazardous chemicals are not normally stored in safety-related areas. Storage, when necessary, is controlled by administrative procedures to include a permit system.
4.	Materials Containing Radioactivity	Materials containing radioactivity are not normally stored in safety-related areas. Storage, when necessary, is controlled by administrative procedures to include a permit system.

TABLE 9.5-12

FIRE PROTECTION PROGRAM COMPARISON
WITH APPENDIX R TO 10 CFR 50

On October 27, 1980 the Nuclear Regulatory Commission approved a rule concerning fire protection. The rule and Appendix R were developed to establish the minimum acceptable fire protection requirements necessary to resolve certain areas of concern between the NRC staff and licensees of plants operating prior to January 1, 1979.

This fire protection rule does not apply to Grand Gulf Nuclear Station; however, as a result of a meeting held with the NRC staff on June 30, 1981, and at the staff's request, a comparison of the Grand Gulf Nuclear Station fire protection program to the requirements outlined by 10 CFR 50, Appendix R, Sections II and III is given below:

Appendix R Requirement	Grand Gulf Nuclear Station Position /Discussion
II. General Requirements	
A. Fire Protection Program	Meets the intent. Details of the program are given in Appendix 9B.
B. Fire Hazards Analysis	The Grand Gulf Fire Hazards Analysis Report was reviewed and approved by a qualified fire protection engineer and systems engineers, and is a separate controlled plant document. The fire hazards analysis includes the identification of potential in situ and transient fire hazards and the determination of the consequences of a fire in any location on the ability to safely shut down the plant. Where necessary, specific fire protection measures were provided to ensure that safe shutdown capability was maintained in the event that a postulated fire were to occur.

TABLE 9.5-12 (Cont.)

C. Fire Prevention Features	1. Meets the intent. As discussed in the Fire Hazards Analysis Report, all in situ fire hazards have been identified, and suitable fire protection measures have been provided.
	2. Meets the intent. Details are provided in Appendix 9B, Section 9B.8, Administrative Controls.
	3. Meets the intent. As described in the Fire Hazards Analysis Report, fire detection systems, portable extinguishers, and standpipe and hose stations are installed in strategic locations throughout the plant.
	4. Meets the intent. As described in the Fire Hazards Analysis Report, fire barriers and automatic fire suppression systems have been installed in the plant where required to protect redundant safe shutdown-related systems and components.
	5. See the discussions of items III.H and III.I.
	6. Meets the intent. Fire detection and suppression systems have been designed by the Architect Engineer and approved for use by American Nuclear Insurers (ANI). Installation of the systems was performed by trade craftsmen. Maintenance and testing is performed in accordance with approved maintenance

Amend.

TABLE 9.5-12 (Cont.)

		and surveillance procedures and the Grand Gulf Technical Specifications under the supervision of personnel properly qualified by experience and training for such work.
		7. Meets the intent. Surveillance procedures have been established and are performed in accordance with the requirements of the Grand Gulf Technical Specifications and the Grand Gulf Operations Manual.
	D. Alternative or Dedicated Shutdown Capability	As discussed in the Fire Hazards Analysis Report, suitable fire protection measures have been provided to ensure that a fire in any area of the plant outside the control room will not affect safe shutdown capability. For a discussion of a fire in the control room, see Section III.L of this table.
III.	Specific Requirements	
	A. Water Supplies for Fire Suppression Systems	Meets the intent. As described in subsection 9.5.1.2.1, the Grand Gulf fire protection water supply system consists of two 300,000-gallon nominal capacity water storage tanks at atmospheric pressure and three 1500 gpm fire pumps (one electric, two diesel). Each of the three fire pumps has the capability to take suction from either water storage tank. Each tank has the capability of supplying the maximum fire water demand

Amend.

TABLE 9.5-12 (Cont.)

		for a safety-related area for 2 hours. Therefore, an adequate fire water source is constantly available.
B.	Sectional Isolation Valves	Meets the intent. As described in subsection 9.5.1.2.2.1 and shown on Figures 9.5-2 and 9.5-3, post indicator valves are provided to permit isolation of portions of the 12-inch underground fire main loop for maintenance or repair without interrupting the entire water supply.
C.	Hydrant Isolation Valves	Meets the intent. As shown on Figures 9.5-2, 9.5-3, and 9.5-8, valves are installed to permit isolation of outside hydrants from the fire main for maintenance or repair without interrupting the water supply to automatic or manual fire suppression systems in any area containing or presenting a fire hazard to safety-related or safe shutdown equipment.
D.	Manual Fire Suppression	Meets the intent. As discussed in subsection 9.5.1.2.2.2 and snown on Figures 9.5-2, 9.5-3, 9.5-7, and 9.5-8, standpipes and hose streams are strategically located throughout the plant. All areas containing safety-related or safe shutdown equipment are designed to permit effective functioning of the plant fire brigade.

TABLE 9.5-12 (Cont.)

		All fire suppression systems located inside containment are supplied by the condensate and refueling water storage and transfer system (CRWST) with backup supply available from the fire water loop. The capacity, adequacy, and reliability of the CRWST system is described in subsection 9.5.1.2.1. Hose stations located inside containment are provided with sufficient lengths of hose to reach any location inside the containment with an effective hose stream. Standpipes and hose stations outside the drywell are provided with additional lengths of hose available to reach areas in the drywell.
E.	Hydrostatic Hose Tests	Meets the intent. All fire hose shall be tested at a pressure of 150 psi or 50 psi above maximum fire main operating pressure, whichever is greater. Outside hose shall be tested annually. Interior hose shall be tested every 3 years.
F.	Automatic Fire Detection	Meets the intent. As described in subsection 9.5.1.2.2.7, automatic fire and smoke detectors are installed in all areas of seismic Category I structures that contain or present a potential exposure fire hazard detrimental to safe shutdown or

TABLE 9.5-12 (Cont.)

		to the operation of safety-related systems or equipment. Additional information concerning power supplies is described in subsection 9.5.1.2.2.13.
G.	Fire Protection of Safe Shutdown Capability	1. Comply. Active and passive fire protection measures have been provided to ensure hot and cold shutdown capability. 2. As described in the Fire Hazards Analysis Report, adequate protection has been provided to ensure that a single exposure fire could not affect redundant safe shutdown-related components. 3. As discussed in the Fire Hazards Analysis Report, alternate or dedicated shutdown capability is not required for any area in the plant, except as discussed in Section III.L of this table.
H.	Fire Brigade	Meets the intent. The fire brigade is staffed and equipped in accordance with the provisions stated. (See also Appendix 9B.)
I.	Fire Brigade Training	Comply. (See also Appendix 9B.)
J.	Emergency Lighting	Comply. As discussed in subsection 9.5.3.1.1 and Table 9.5-11, Section D.5.a, eight-hour emergency lighting has been provided in the control room, remote shutdown panel areas, and in the access and egress routes thereto.

Amend.

TABLE 9.5-12 (Cont.)

K.	Administrative Controls	Meets the intent. Additional information is provided in Appendix 9B, subsection 9B.8.
L.	Alternate or Dedicated Shutdown Capability	Alternate shutdown capability for a fire in the control room will be provided before startup after the first refueling outage, in accordance with Grand Gulf Operating License requirements. In the interim period prior to the provision of an alternate shutdown capability, compensatory measures, including a shutdown procedure, have been developed to mitigate the effects of a limited control room fire.
M.	Fire Barrier Cable Penetration Seal Qualification	Meets the intent. As discussed in subsection 9.5.1.2.2.9 and Table 9.5-11, Section D.3, fire barrier cable penetration seals are qualified and tested in accordance with NFPA, ANI, and IEEE standards. The fire barrier penetration rating generally equals the fire rating of the respective barrier. Additional information on this issue was provided to the NRC at the NRC staff's request by letter dated August 21, 1981 (AECM-81/309).
N.	Fire Doors	Meets the intent. Fire doors are provided with self-closing mechanisms. Fire doors, when used as security doors, are kept closed and electrically supervised. All fire doors are periodically inspected. The fire brigade leader has

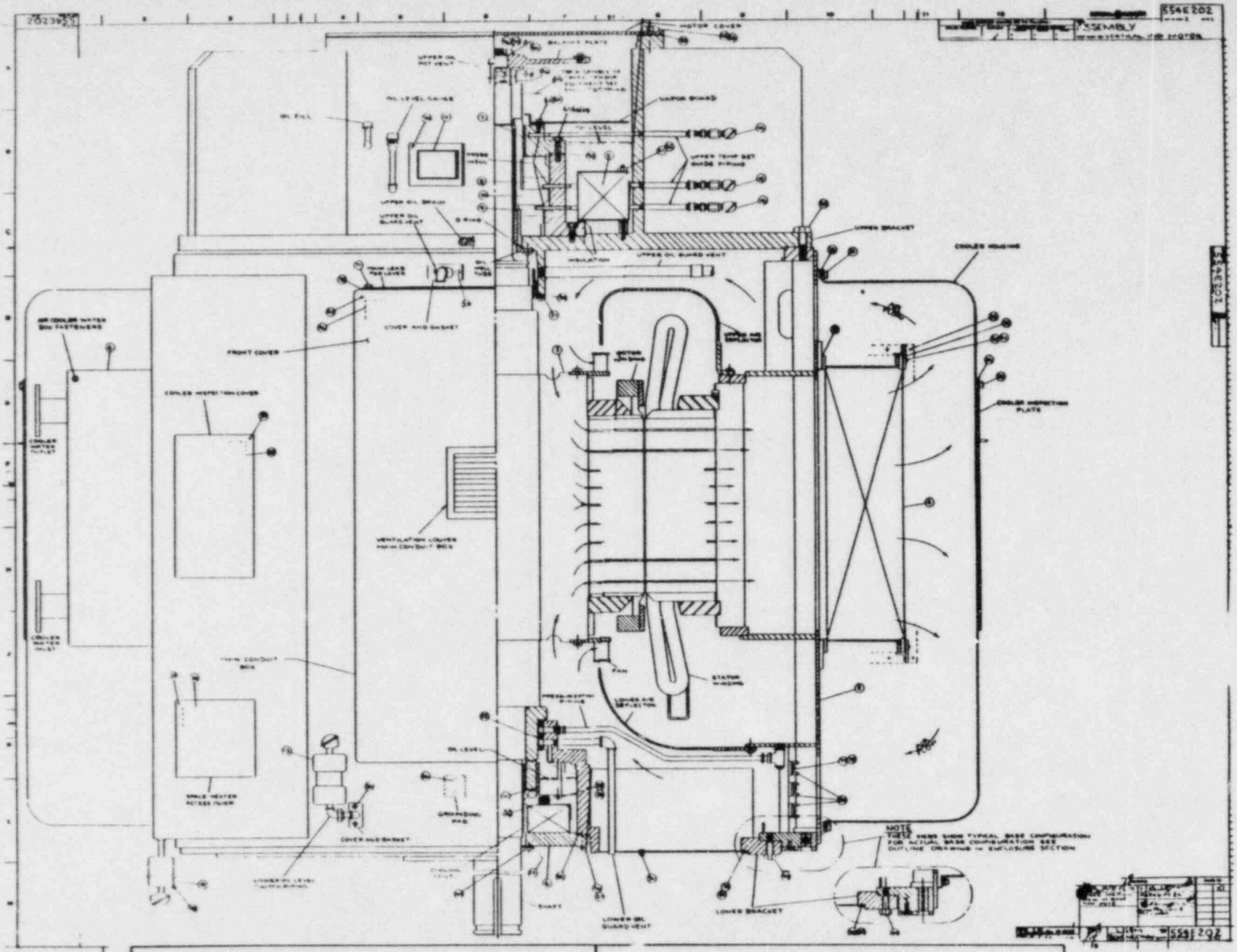
TABLE 9.5-12 (Cont.)

		ready access to keys for any locked fire doors.
O.	Oil Collection System for Reactor Coolant tion Pump	An exposure fire due to the ignition of the recircula- pump lubricating oil is not a credible event. Each motor, which is similar in design to those of LaSalle and Zimmer, utilizes self-lubricated bearings. An upper reservoir containing 52 gallons of lubricating oil surrounds the upper guide bearing and thrust bearing. A lower reservoir containing 7.5 gallons of lubricant surrounds the lower guide bearing. The reservoirs are formed by heavy bearing brackets and, for the lower reservoir, a 1-5/8-inch-thick "oil pan." Details of this design are shown in Figures 9.5-25 and 9.5-26, Reactor Recirculation Pump Motor Assembly. The lubricating oil is cooled by cooling coils installed within the reservoirs. Since the bearings are self-lubricated and the oil is cooled within the reservoir, a pressurized oil system is neither required nor utilized. This design also minimizes piping connections to the oil reservoir. As may be noted from the referenced figures, connections are limited to atmospheric vents, drains, fill connections, and level monitoring connections. The heavy construction and non-pressurized design of this lubricating system

Amend.

TABLE 9.5-12 (Cont.)

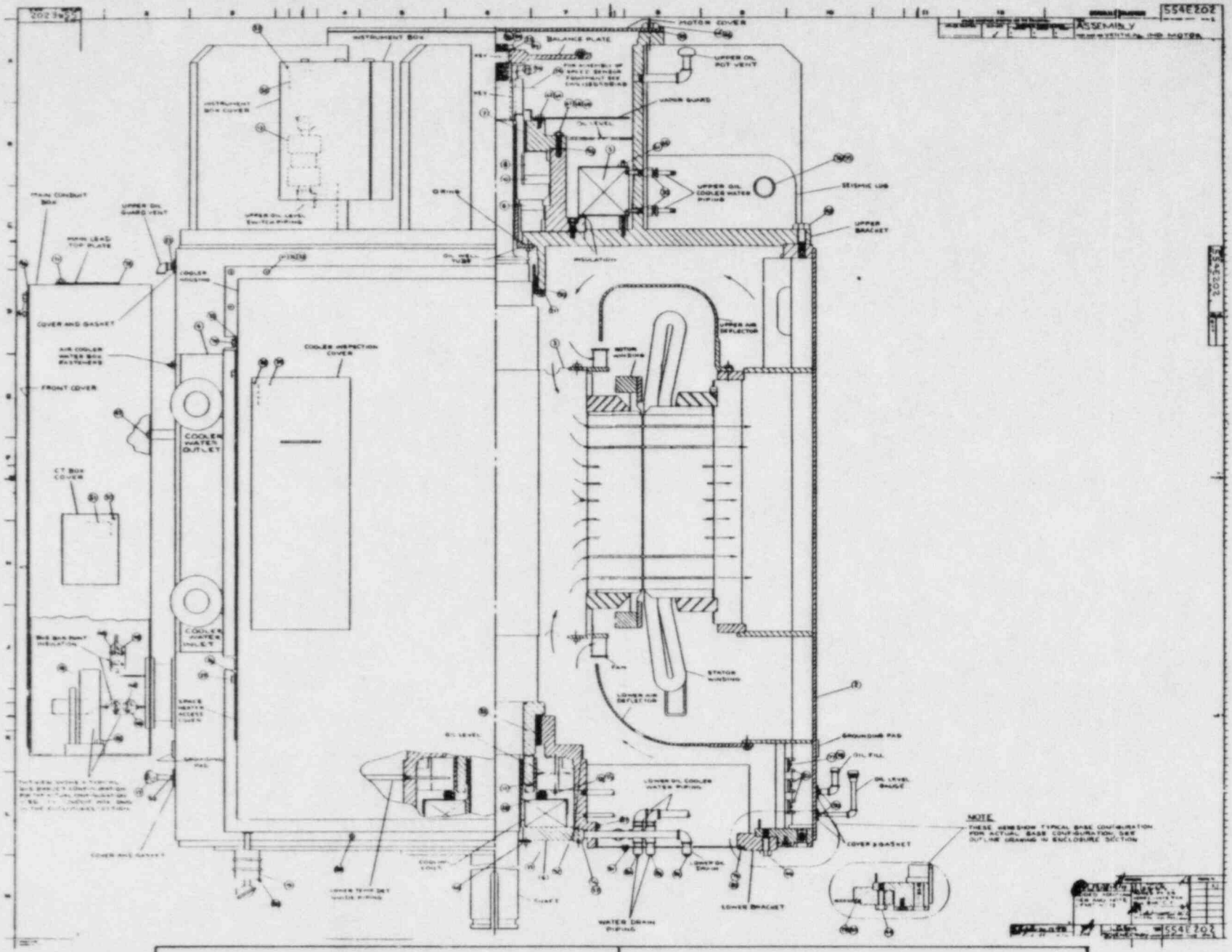
	minimizes the susceptibility of the system to leakage. Also, if a leak were to occur, ignition-enhancing spray would be unlikely. Therefore, an exposure fire due to the ignition of the recirculation pump lubricating oil is not credible and additional fire protection measures for the recirculation pumps, such as an engineered oil containment and collection system, are not required. This position was accepted by the NRC in SER subsection 9.5.9.



MISSISSIPPI POWER & LIGHT COMPANY
GRAND GULF NUCLEAR STATION
UNITS 1 & 2
FINAL SAFETY ANALYSIS REPORT

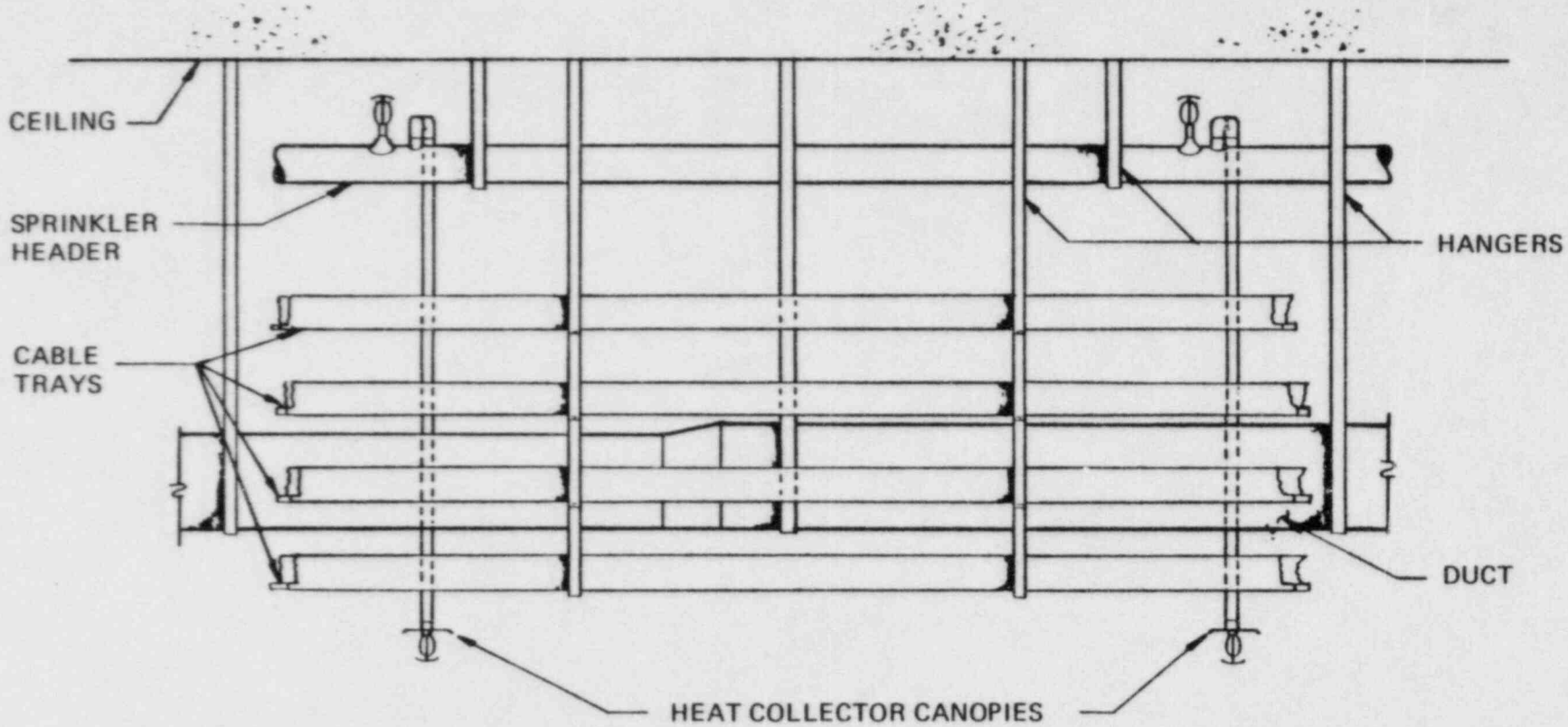
REACTOR RECIRCULATION
PUMP MOTOR ASSEMBLY
FIGURE 9.5-25

Amend.



MISSISSIPPI POWER & LIGHT COMPANY GRAND GULF NUCLEAR STATION UNITS 1 & 2 FINAL SAFETY ANALYSIS REPORT	REACTOR RECIRCULATION PUMP MOTOR ASSEMBLY FIGURE 9.5-26

Amend.



MISSISSIPPI POWER & LIGHT COMPANY GRAND GULF NUCLEAR STATION UNITS 1 & 2 FINAL SAFETY ANALYSIS REPORT	TYPICAL SPRINKLER ARRANGEMENT FOR SYSTEMS COVERING REDUNDANT SAFE SHUTDOWN-RELATED RACEWAYS FIGURE 9.5-27

AMEND.

GRAND GULF NUCLEAR STATION
UNITS 1 & 2

APPENDIX 9A

FIRE HAZARDS ANALYSIS REPORT

The GGNS Fire Hazards Analysis Report is maintained as a separate controlled document. Revision 1 of the Fire Hazards Analysis Report was submitted to the NRC on May 7, 1985, via letter from L. F. Dale to H. R. Denton (AECM-85/0129).

9B.2.2.6 Plant Quality Superintendent

The Plant Quality Superintendent has the responsibility for ensuring compliance with the Fire Protection Program through the GGNS Operational Quality Assurance Program, as described MPL-TOP 1A and Table 9.5-11, Position C.

9B.2.2.7 Training Superintendent

The Training Superintendent has the responsibility for implementation of the fire protection training program as described in subsection 13.2.4. He shall ensure that training and qualification of plant personnel and the fire brigade are maintained.

9B.2.2.8 Technical Superintendent

The Technical Superintendent is responsible for developing preventive and corrective maintenance procedures for the plant fire protection systems, structures, and components.

9B.2.2.9 Maintenance Superintendent

The Maintenance Superintendent is responsible for the implementation of preventive and corrective maintenance programs for equipment, structures, and components associated with the fire protection system.

9B.3 QUALIFICATIONS OF PERSONNEL

The fire brigade members' qualifications shall include satisfactory completion of a physical examination for performing strenuous activity.

The personnel responsible for the maintenance and testing of the fire protection systems shall be qualified by training and experience for such work.

The personnel responsible for the training of the fire brigade shall be qualified by training and experience for such work.

9B.4 FIRE PROTECTION EVALUATION

In accordance with the Nuclear Regulatory Commission's request by letter dated September 30, 1976 (MAEC-76/49), a re-evaluation of the Grand Gulf Nuclear Station Fire Protection Program was performed. The evaluation entailed a point-by-point comparison of the GGNS Fire Protection Program and systems design to the positions as outlined in Appendix A to Branch Technical Position APCSB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976." The methods for and results of the evaluation are presented in the Fire Hazards Analysis Report and

Amend.

Table 9.5-11, respectively. A discussion of potential fire hazards and a detailed analysis of the consequences of a fire in each fire area is presented in the Fire Hazards Analysis Report.

On October 27, 1980, the Nuclear Regulatory Commission approved a rule concerning fire protection. The rule and its Appendix R were developed to establish the minimum acceptable fire protection requirements necessary to resolve certain areas of concern in contrast between the NRC staff and licensees of plants operating prior to January 1, 1979.

This fire protection rule does not apply to the Grand Gulf Nuclear Station; however, as a result of a meeting held with the NRC staff on June 30, 1981 and at the NRC staff's request, a comparison of the Grand Gulf Nuclear Station Fire Protection Program to the requirements outlined by 10 CFR 50, Appendix R, Sections II and III was performed. The results of this comparison are presented in Table 9.5-12.

9B.5 FIRE DETECTION AND SUPPRESSION SYSTEMS

Details of the fire protection system are presented in Section 9.5.

9B.6 ALTERNATE SHUTDOWN

Alternative shutdown capabilities are provided in order to achieve a safe cold shutdown of the plant. As discussed in the Fire Hazards Analysis Report, a fire in any area of the plant will not affect the safe shutdown capability. An exposure fire in the control room which disables both divisions of redundant systems necessary for safe shutdown is not considered a credible event. However, in response to the NRC staff's request, and in order to ensure the availability of the remote shutdown panel in the event of a control room fire, electrical isolation will be provided between the control room and the Division I remote shutdown panel. Additional information is provided in Table 9.5-12, Section III.L, and the GGNS Safety Evaluation Report, NUREG-0831, Supplement 1, dated December 1981.

9B.7 PROGRAM IMPLEMENTATION

The fire protection program for GGNS will be fully operational prior to initial fuel load.

Plant administrative procedures will describe the details and provide for additional instructions to implement the requirements of the Fire Protection Program stated herein.

Responsibilities of those persons or organizations needed to implement the Fire Protection Program are provided in Section 9B.2.

4. An assessment of each fire brigade member's knowledge in the fire fighting strategy and techniques for the fire area

5. An assessment of the brigade's conformance to established plant fire fighting procedures and use of the fire fighting equipment, including self-contained breathing equipment, communication equipment, and ventilation equipment when applicable.

6. Assessment of the fire brigade leader's effectiveness in directing the brigade's activities.

9B.12 QUALITY ASSURANCE

The GGNS fire protection system goes through two major phases from system design to operational status. These phases are: (1) design, procurement, and construction; and (2) startup testing and operation. Appropriate quality assurance programs and requirements are applied to the fire protection system during each phase.

The QA program applied to each phase addresses the 10-point QA criteria presented in Section C of Appendix A to Branch Technical Position APCSB 9.5-1. Furthermore, in each phase, the QA activities are under the management control of the appropriate QA organization. Management control, as used here, is defined as the authority and responsibility for establishing, controlling, and verifying the implementation and adequacy of the fire protection QA program.

During the design, procurement, and construction phases of the fire protection system, the fire protection QA program is under the management control of the Bechtel Grand Gulf QA organization. This program has been developed to ensure that the Grand Gulf design is of sufficient quality to meet its design function. Table 9.5-11, Section C, has been revised to provide the QA program scope and description. During this phase, the MP&L Manager of Quality Assurance has the responsibility for verifying the implementation and adequacy of the Bechtel fire protection QA program chiefly through a documented audit program.

During the operational phase (startup, preoperational testing, and operations), the fire protection QA program is under the management control of the MP&L QA organization. The specific organizations which exercise this control are: Quality Assurance, Plant Quality, Nuclear Plant Engineering, Plant Technical Support (Engineering), Maintenance, and Operations. Section C of Table 9.5-11 provides the scope and description of the QA Fire Protection Program applicable during the startup and operational phases.

Amend.

vaporizer, and carbon dioxide supply piping with all necessary valves and instrumentation and a common hydrogen bulk storage unit. The hydrogen and carbon dioxide system components, piping, valves, and instrumentation are shown in Figures 10.2-1 through 10.2-3.

The hydrogen and carbon dioxide bulk storage units are located outdoors. The hydrogen and carbon dioxide gas filling unit is located inside the turbine building at El 129'-0" in an area classified as radiation zone B.

All hydrogen piping downstream of the hydrogen bulk storage unit pressure control station to the Unit 1 and Unit 2 turbine buildings is enclosed in guard pipe and routed underground for hydrogen piping protection and leakage detection.

10.2.5.3 System Evaluation

The hydrogen and carbon dioxide system serves no safety function. Systems analysis has shown that failure of the hydrogen and carbon dioxide system will not compromise any safety-related systems or prevent safe shutdown.

Eighteen hydrogen storage cylinders, each containing 32,560,000 ft-lbs of energy, are located on a slab at grade, open on all sides, approximately 385 feet away from the nearest building containing safety-related or Class IE power system components as shown on Figure 2.1-2. This separation distance together with the open space location precludes adverse effects resulting from the unlikely possibility of any explosions or fires. The hydrogen storage cylinders bank is provided with a means of fire protection as described in the Fire Hazards Analysis Report.

A fence is erected around the hydrogen bulk storage unit to further protect the storage area. "No Smoking" signs and "Danger Regulating Station" signs are posted in accordance with NFPA requirements.

The hydrogen distribution headers inside the turbine building are routed as follows:

(1) Headers are located to prevent physical damage to pipe.

(2) Headers are located away from equipment that present a fire hazard to hydrogen.

(3) Headers are routed through ventilated areas.