

NMP Unit 2 USAR

APPENDIX 9A

DEGREE OF COMPLIANCE WITH BRANCH TECHNICAL POSITION
CMEB 9.5-1, REV. 2 DATED JULY 1981

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APPENDIX 9A

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DEGREE OF COMPLIANCE WITH BRANCH TECHNICAL POSITION CMEB 9.5-1 REV. 2, DATED JULY 1981

9A.1 INTRODUCTION

This section provides a discussion of compliance or justification of an alternative approach to Branch Technical Position (BTP) CMEB 9.5-1 Revision 2, dated July 1981, on a point-for-point basis.

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9A.2 DISCUSSION

9A.2.1 Defense-in-Depth

The Nine Mile Point Nuclear Station - Unit 2 (Unit 2) fire protection program extends the concept of defense-in-depth to fire protection in safety-related fire areas with the following objectives:

1. Prevent fires from starting.
2. Detect rapidly, control, and extinguish promptly those fires that do occur.
3. Provide protection for safety-related structures, systems, and components so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the safe shutdown of the plant. Questions of separation or protection of safety-related equipment are evaluated to determine the ability of plant systems to achieve and maintain safe shutdown in Final Safety Analysis Report (FSAR) Appendix 9B in accordance with the requirements of 10CFR50 Appendix R, Section III.G, using the guidance given in Nuclear Regulatory Commission (NRC) Generic Letter 86-10.

9A.2.2 Use of Water on Electrical Cable Fires

The Unit 2 fire protection program incorporates fixed water sprinkler systems on concentrated safety-related cable trays.

9A.2.3 Establishment and Use of Fire Areas

Unit 2 fire areas have been established mainly to separate safety-related structures and systems from nonsafety-related structures and systems. In addition, the Unit 2 design inherently separates the equipment and cables of one division from the redundant equipment and cables of other divisions.

In areas where separation by fire barriers is not feasible, other measures have been provided to prevent fire from causing the loss of redundant safety-related systems.

Ventilation systems incorporate the use of fire and smoke dampers as required to isolate ductwork that serves more than one fire area.

Unit 2 fire areas, fire subareas, and fire zones are shown on Figures 9A.3-2 through 9A.3-8.

Fire barriers required by BTP 9.5-1 Rev. 2 are specifically marked on Figures 9A.3-2 through 9A.3-8. Nonrated barriers which deviate from the requirements of BTP 9.5-1 Rev. 2 are also shown.

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Justification for the deviations is provided in Section 9A.3.1.2.5.

9A.2.4 Definitions

Approved Tested and accepted for a specific purpose or application by a nationally recognized testing laboratory.

Associated Circuits Cables (safety-related, nonsafety-related, Class 1E, and non-Class 1E) that have a physical separation less than that required by Section III.G.2 of Appendix R, and one of the following:

1. A common power source with the shutdown equipment (redundant or alternative) and the power source is not electrically protected from the circuit of concern by coordinated breakers, fuses, or similar devices.
2. A connection to circuits of equipment whose spurious operation would adversely affect the shutdown capability.
3. A common enclosure with the shutdown cables that is not protected by circuit breakers, fuses or similar devices, or that will allow propagation of the fire into the common enclosure.

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

Combustible-Free Area An area within the plant where combustible material is limited and administratively controlled.

Combustible Material Material that does not meet the definition of noncombustible.

Control Room Complex The zone served by the control room emergency ventilation system (see Standard Review Plan (SRP) Section 6.4, Habitability Systems).

Exposure Fire An exposure fire is a fire in a given area that involves either in situ or transient combustibles and is external to any structures, systems, or components located in or adjacent to that same area. The effects of such fire (e.g., smoke, heat, or ignition) can adversely affect those structures, systems, or components important to safety. Thus, a fire involving one train of safe shutdown equipment may constitute an exposure fire for the redundant train located in the same area, and a fire involving combustibles other than either redundant train may constitute an exposure fire to both redundant trains located in the same area.

Fire Area Areas within the plant that are totally enclosed by 3-hr fire barriers. Under certain circumstances, barriers of less than 3 hr are acceptable (see 9A.3.1.2.5 and BTP CMEB 9.5-1). Structural steel forming a part or supporting such fire barriers to be protected to provide fire resistance equivalent to

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that required of the barrier. Exterior walls, unless shown on FSAR Figures 9A.3-2 through 9A.3-8, are not fire rated. A fire area consists of one or more fire zones. The fire zones are defined below.

Fire Subarea A subdivision of a fire area that is totally separated from other plant areas by a combination of acceptable fire boundaries as defined in Section III.G.2 of Appendix R. A fire subarea consists of one or more fire zones. The fire zones are defined below.

Fire Zone A plant area whose boundaries need not consist of rated or approved fire barriers, but are chosen based on the physical plant design, convenience, and layout of the fire detection and suppression system.

Fire Barrier Those components of construction (walls, floors, and their supports), including beams, joists, columns, penetration seals or closures, fire doors, and fire dampers, that are rated by approving laboratories in hours of resistance to fire or have been evaluated to provide an adequate level of protection and are used to prevent the spread of fire.

Fire Stop Construction that prevents fire propagation along the length of cables or prevents spreading of fire to nearby combustibles within a given fire area or fire zone.

Fire Brigade The team of site personnel assigned to firefighting and who are equipped for and trained in the fighting of fires.

Fire Detectors A device that detects the presence of fire automatically and initiates an alarm system and other appropriate action (see NFPA Standard 72E, Automatic Fire Detectors). Some typical fire detectors are classified as follows:

Heat Detector - Detects a predetermined (fixed) temperature or rate of temperature rise.

Smoke Detector - Detects the visible or invisible products of combustion.

Flame Detector - Detects the infrared, ultraviolet, or visible radiation produced by a fire.

Line-Type Detector - Continuous detection along a path, e.g., fixed-temperature, heat-sensitive cable and rate-of-rise pneumatic tubing detectors.

Fire Protection Program The components, procedures, and personnel utilized in carrying out all activities of fire protection associated with nuclear power plants, including activities and systems such as fire prevention, detection, annunciation, control, confinement, suppression, smoke removal, extinguishment, administrative procedures, Fire Brigade

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organization, inspection and maintenance, training, quality assurance (QA), testing, control of combustibles, and housekeeping.

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

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

Fire Zones The subdivisions of fire areas in which the fire suppression systems are designed to combat particular types of fires.

Noncombustible Material

1. Material, in the form in which it is used and under anticipated conditions, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat.
2. Material having a structural base of noncombustible material, as defined in item 1 above, with a surfacing not over 1/8-in thick that has a flame spread rating not higher than 50 when measured using ASTM E-84 Test, Surface Burning Characteristics of Building Materials.

Raceway Refer to Regulatory Guide (RG) 1.75.

Restricted Area Any area to which access is controlled by the licensee for purposes of protecting individuals from exposure to radiation and radioactive materials.

Safety-Related Systems and Components Systems and components required to shut down the reactor, mitigate the consequences of postulated accidents, or maintain the reactor in a safe shutdown condition.

Safe Shutdown System A safe shutdown system includes components, panels, cable raceways, conduits, etc., necessary for the system to perform a safe shutdown function. A safe shutdown system is one of several combinations of various plant systems that is capable of achieving safe shutdown of the plant.

Division I - Systems that receive their emergency ac power from standby diesel generator 2EGS*EG1.

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Division II - Systems that receive their emergency ac power from standby diesel generator 2EGS*EG3.

Division III - Systems that receive the emergency ac power from high-pressure core spray (HPCS) diesel generator 2EGS*EG2.

Safe Shutdown Hot or cold shutdown (reactor subcritical) with control and coolant inventory and decay heat removal.

Hot Shutdown The reactor is shut down, the reactor coolant inventory is being controlled while the reactor is being depressurized, and the reactor temperature is greater than 200°F.

Cold Shutdown The reactor is shut down, the reactor coolant inventory is being maintained with the reactor depressurized so that decay heat is being removed from the reactor vessel and transferred to the ultimate heat sink (UHS), and reactor temperature is less than or equal to 200°F.

Sprinkler System A network of piping connected to a reliable water supply that will distribute the water throughout the area protected and will discharge the water through sprinklers in sufficient quantity either to extinguish the fire entirely or to prevent its spread. The system, usually activated by heat, includes a controlling valve and a device for actuating an alarm when the system is in operation. The following categories of sprinkler systems are defined in NFPA Standard 13, Standard for the Installation of Sprinkler Systems:

1. Wet-Pipe System
2. Dry-Pipe System
3. Preaction System
4. Deluge System (open nozzles or sprinklers)

Standpipe and Hose Systems A fixed piping system with hose outlets, hose, and nozzles connected to a reliable water supply to provide effective fire hose streams to specific areas inside the building.

Water Spray System A network of piping similar to a sprinkler system except that it utilizes open-head spray nozzles. NFPA Standard 15, Water Spray Fixed Systems, provides guidance on these systems.

9A.3 POSITION

9A.3.1 Fire Protection Program Requirements

9A.3.1.1 Fire Protection Program

The fire protection program is a program to implement and maintain in effect all provisions of the approved fire protection

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program as described in the FSAR as amended, and as approved in the Safety Evaluation Report (NUREG-1047), dated February 1985, as supplemented. The noncompliances with the above fire protection program that affect the ability to achieve and maintain safe shutdown in the event of a fire shall be reported in accordance with the requirements of 10CFR50.73.

The requirements pertaining to specific attributes of the fire protection program which provide protection to safety-related equipment areas can be found in the following sections:

- 9A.3.3 - Fire Brigade
- 9A.3.5.1.1 - Fire Barriers
- 9A.3.6.1 - Fire Detection
- 9A.3.6.2 - Fire Protection Water Supply System
- 9A.3.6.2.6 - Fire Pumps
- 9A.3.6.2.7 - Outside Hose Installations
- 9A.3.6.3.3 - Sprinkler and Water Spray Systems
- 9A.3.6.3.4 - Manual Hose Installations
- 9A.3.6.4 - Halon 1301 Suppression Systems
- 9A.3.6.5 - CO₂ Suppression Systems

The Unit 2 fire protection program establishes a fire protection policy for the protection of safety-related structures, systems, and components and the procedures, equipment, and personnel required to implement the program.

9A.3.1.1.1 Vice President Nine Mile Point

The Vice President Nine Mile Point will have the responsibility for the direction and implementation of the fire protection program at Nine Mile Point Nuclear Station - Unit 1 (Unit 1) and Unit 2.

9A.3.1.1.2 Defense-in-Depth

The Unit 2 fire protection program extends the concept of defense-in-depth to fire protection in safety-related areas, with the following objectives:

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

9A.3.1.1.3 Responsibility for Overall Fire Protection Program

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The Senior Constellation Nuclear Officer Responsible for Nine Mile Point has the overall management responsibility for the nuclear fire protection program.

The Vice President Nine Mile Point has the overall responsibility for the fire protection program at the Nine Mile Point Nuclear Station, LLC (NMPNS).

The Manager Operations reports to the Plant General Manager and is responsible for managing, overseeing, and coordinating the NMPNS fire protection functional and technical activities.

The Fire Protection Program Manager reports to the General Supervisor Engineering Programs and is responsible for managing, overseeing, and coordinating the Fire Protection Engineering group.

9A.3.1.1.4 Organization Responsibilities

The Vice President Nine Mile Point has the overall responsibility for the fire protection program implementation for NMPNS. He will retain ultimate responsibility even though formulation and assurance of the program are delegated.

The Manager Operations is responsible for fire protection at the Unit 2 plant, and ensuring surveillance testing and periodic maintenance to fire protection equipment.

The Manager Maintenance has the responsibility for major maintenance on pumps, valves, and other associated equipment.

The General Supervisor Electrical and Control Maintenance will ensure that the calibration of gauges and pressure switches, etc., is done at the required frequency.

The Manager Operations will ensure that any fire tests assigned are performed and require markups placed as requested.

The Manager Training and the Fire Marshal will ensure that plant personnel are scheduled to attend the required fire training sessions.

The Fire Marshal will implement regular inspections of the plant to ensure that accumulation of combustible materials is minimized in safety-related areas. During plant shutdown, he will ensure that adequate fire protection is maintained in the drywell and in other areas as necessary.

A Fire Brigade Leader and four Fire Brigade members are assigned to respond to fire emergencies. The Fire Brigade is responsible for fire response and rescue. Site administrative controls require that at least two first aid responders are available at all times for medical response.

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The Fire Protection staff performs all surveillance testing on fire protection equipment. These inspection tests are reviewed by the Fire Marshal.

The Fire Marshal and the Manager Training ensure that all Fire Brigade members receive training in accordance with plant procedures to maintain qualified individuals as part of the Fire Brigade.

The Training Department periodically conducts fire drills which are critiqued by the Training staff and subsequently reviewed by the Fire Marshal. The Fire Marshal works with the Director Emergency Preparedness in writing, reviewing, and implementing emergency procedures relative to fire, rescue, and first aid.

Each supervisor is responsible for ensuring that each department observes good safety practices in the use and control of combustible materials and the use or control of equipment that may be an ignition source. Each employee or contractor is responsible for good housekeeping.

Also, each supervisor shall ensure that activities are carried out in a manner that does not endanger essential plant equipment cabling, piping, or instrumentation necessary for safe operation of the plant.

The Director Quality and Performance Assessment will ensure that the Quality Assurance Program is implemented by planned inspections and scheduled audits, assuring that the results are promptly reported to cognizant management personnel.

9A.3.1.1.5 Personnel Qualifications

The Fire Protection Program Manager provides organization, direction, and guidance concerning the implementation of the fire protection program. He is, or has under his supervision, a Fire Protection Engineer who is a graduate of an engineering curriculum of accepted standing and has completed not less than 6 yr of engineering attainment indicative of growth and engineering competency and achievement, at least 3 yr of which have been in responsible charge of fire protection engineering work. He is, or meets the eligibility requirements of, a Member of the Society of Fire Protection Engineers.

Additional fire protection engineers are graduates of a curriculum of accepted standing and have completed not less than 2 yr of fire protection engineering experience indicative of growth and achievement.

Prior to assignment, each member of the Fire Brigade must pass a physical examination to determine their capability to perform strenuous firefighting activities. This examination is evaluated by a physician.

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Personnel responsible for maintenance and testing of fire protection systems are trained in system operations and procedures to perform such work.

The Fire Marshal has a background in fire protection and nuclear safety commensurate with the responsibilities of the position (see also Table 13.1-2). Qualified Fire Protection Engineers and personnel qualified in nuclear safety are also available to support the Supervisor Fire Protection as needed.

The Generation Specialist-Training Department and/or a consultant are jointly in charge of classroom and hands-on training. This individual has practical experience in fireground tactics and is knowledgeable in fire protection system design as it applies to Unit 2.

In addition, a company-approved fire school is used for much of the Fire Brigade training, using the experience and expertise of the fire school instructors.

9A.3.1.2 Fire Hazards Analysis

9A.3.1.2.1 Introduction

The fire hazards analysis (FHA) for Unit 2 consists of three parts:

1. Safe shutdown evaluation (Appendix 9B), which describes the methodology used to assemble, analyze, and document the ability of Unit 2 to conduct a safe shutdown following a fire.
2. Fire hazard/fire loading tables (Tables 9A.3-1 to 9A.3-12) which identify: hazards in safety-related and nonsafety-related areas; the concentration of combustibles (which includes oil, electrical insulation, charcoal, resins, and packing materials where it is known that they will exist and where immediate removal is uncertain); and the type of fire detection systems and suppression systems provided in each area.
3. Fire hazard analysis which (for each building) provides a summary of the construction and occupancy, and a summary which shows that the fire protection system will provide adequate ability to detect, prevent, and suppress postulated fire outbreaks in and around the plant.

9A.3.1.2.2 Organization of Fire Hazards Analysis

In order to develop data meaningful to the analysis, the plant has been divided into numerous fire areas, and these areas are further subdivided into fire zones. The fire areas and zones are

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shown on Figures 9A.3-2 through 9A.3-8. Fire areas are those areas separated from adjacent areas by rated fire barriers. A comparison between Unit 2 fire barriers and tested fire barriers is provided in Section 9A.3.5.1.1.

Calculation of fire loading for each fire zone is included in Tables 9A.3-1 through 9A.3-12. The basis of calculation is shown below.

9A.3.1.2.3 Basis of Calculation

In Tables 9A.3-1 through 9A.3-12, all known combustibles including transient combustibles are identified for each fire zone. The calorific content of the combustibles and the Btu/sq ft loading for each fire area have been calculated. In order to determine the fire loading, it was necessary to make some assumptions concerning the amount of combustibles in such equipment as motors and control cabinets. The following assumptions, which are based on engineering judgment, were utilized to estimate the weight of combustibles:

<u>Equipment</u>	<u>Weight of Combustible</u>
Motors	1% of overall weight
Switchgear	5 lb/sq ft of floor space
Battery charger	5 lb/sq ft of floor space
Instrument rack	4 lb/sq ft of floor space
Unit substation	3 lb/sq ft of floor space
Panels	3 lb/sq ft of floor space
Motor control center	6.7 lb/sq ft of floor space
Transformer	3 lb/transformer
Batteries and resistors	Actual calculated weight
Cable	31% to 76% of overall weight

The following calorific values are used for combustibles. These values are based on vendor data or the NFPA Fire Protection Handbook, 14th edition:

<u>Combustible</u>	<u>Calorific Values (Btu/lb)</u>
Electrical cables	9,500-12,000
Motor insulation	10,000
Lube oil	20,000
General combustibles	8,000
Hydrogen	65,000
Clothing	8,000
Hydraulic fluid	18,000
Hydraulic snubber fluid	10,800
Resin	18,000
Fiberglass	13,000
Charcoal	14,100

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Styrene	18,000
Wood	8,000
Paper	8,000
Diesel fuel	19,000
Asphalt	18,000
Plastic	20,000
Carpet	10,000

The construction materials used for roofing were not included in the fire load. Metal deck roofs are Factory Mutual Class 1 and considered noncombustible for the purposes of this analysis.

Each fire area was investigated for fire loading. Further delineation of the hazards analysis into fire zones provides a closer estimation of fire loads within the fire area. The total Btu content of each area or zone is the sum of all combustibles in that zone.

$$\begin{aligned}\text{Average Fire Load} &= \frac{\text{Total Btu content (Btu)}}{\text{Area of Zone (ft}^2\text{)} \times 80,000 \text{ Btu/ft}^2 \text{ hr}} \\ &= \text{Hours of fire load}\end{aligned}$$

9A.3.1.2.4 Summary of Conclusions

Calculated fire loadings for major plant areas are listed in Tables 9A.3-1 through 9A.3-12.

In determining the average and/or theoretical durations of fire exposure, the limitations inherent in the analysis must be considered. The average durations presented in Tables 9A.3-1 through 9A.3-12 are based on the following assumptions:

1. Cable trays are considered fully loaded.
2. The combustion air supply is considered unlimited.
3. The automatic suppression systems are considered unavailable.
4. No manual suppression systems are initiated.

During an actual fire, a number of inherent program characteristics, such as manual and automatic suppression systems, limit the overall impact of the fire loading.

The oil day tank and oil storage (turbine building) rooms have high fire loadings because total volume burning has been assumed. This calculation also takes no credit for fixed extinguishing systems provided for all oil hazards. Also, a free influx of air is assumed. If the fire barrier remains intact, a significantly reduced fire exposure can be expected. This is also true for the asphalt storage area of the radwaste building included in the analysis of fire area (FA) 57 in fire zone (FZ) 961 NW, and the

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combustible liquids and Class A combustibles storage area in the turbine building track bay included in the analysis of the FA 49 in FZ 701 NW.

The next highest fire loadings exist in the control building. The high loading is due to heavy power and control cable concentrations in the main control room, relay room, computer room, and electrical tunnels. Calculations for these areas are conservative because all cable trays are assumed to be loaded to the maximum allowable extent. In any case, cable trays in the main control room, relay room, computer room, and electrical tunnels are protected by fixed automatic or manual gaseous fire suppression systems or fixed automatic water fire suppression systems.

In calculating fire loading for the diesel generator room, a fuel oil pipe rupture has been assumed with the entire contents of the fuel oil day tank spilled on the floor. It was also considered that all of the lube oil contained in the crankcase of the engine would leak out. These assumptions resulted in a fire loading of 2 hr 12 min, which is still less than the 3-hr walls that have been provided. Automatic preaction water sprinkler systems have been provided for the diesel generator building.

Portions of the turbine building, the normal switchgear rooms (east and west), and the I&C shop, as well as the electrical tunnels, the control building corridor at el 261 ft, and the normal switchgear building, also have high fire loadings. However, the fire loading is less than the 3-hr fire walls that have been provided. Total-flooding CO₂ systems have been used in the normal switchgear building and in other switchgear rooms.

Fire loading for all other areas is less than 2 hr. In spite of the low fire loading, 3-hr fire walls have been provided wherever separation is required or desirable.

9A.3.1.2.5 Detailed Fire Hazards Analysis by Building

The following sections provide the detailed FHA and a summary of the effects of fires in fire zones. This summary shows that the fire protection system will provide adequate ability to detect, prevent, and suppress postulated fire outbreaks in and around the plant.

9A.3.1.2.5.1 Standby Gas Treatment Building

Introduction

The standby gas treatment (SGT) building is adjacent to the reactor building. It houses the standby gas treatment system (SGTS) units, reactor building ventilation supply unit, and railroad access bay, all of which are separated from each other by 3-hr fire walls and floors. Construction of the SGT building is detailed in Section 3.8.4.1.9.

Safety-Related Systems

The SGTS units are the only safety-related equipment in this building.

Post-fire Analysis

The average fire loading in the SGT building is 36 min. Redundant SGTS units are separated by 3-hr rated barriers. With fire protection equipment out of service, the fire wall separation precludes a fire in one section from disabling the redundant train of equipment. With fire protection equipment in service, the fire would be extinguished promptly.

Radioactive Release Analysis

Since the redundant SGTS units are separated from each other by 3-hr fire walls, a single fire could not render both units inoperative, thereby resulting in a leakage of radioactivity to the environment, even if the fire protection system is out of service. With the fire protection system in service, a fire would be extinguished. Details of the SGTS are provided in Section 6.5.1.

Fire Detection and Suppression

Each area of the SGTS building is protected by a zoned, early-warning detection system arranged to alarm locally and in the control room.

The charcoal banks in the SGTS units are protected by manually-operated water spray systems. Detection is provided for the charcoal filters.

A dry-pipe sprinkler system is provided in the railroad access bay to protect against fire hazards. Manual water hose reels and portable extinguishers are provided as backup protection. Drains are described in Section 9A.3.5.1.12. Portable smoke removal equipment is available.

9A.3.1.2.5.2 Control Building

Introduction

The control building has five elevations, two below ground and three above. Vertical cable chases extend from el 214'-0" through 306'-0". Major equipment location is as follows:

El 214 ft 0 in	Battery room and cable routing areas
El 237 ft 0 in	Cable routing areas

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El 261 ft 0 in	Switchgear rooms, remote shutdown rooms, air conditioning equipment rooms, battery rooms, and cable routing areas
El 288 ft 6 in	Relay rooms, computer room, air conditioning equipment room, and cable routing areas
El 306 ft 0 in	Control room, air conditioning equipment rooms, and cable routing areas

The lower three elevations have complete divisional separation with 3-hr fire walls and floors separating each of the three divisions. Separation between each elevation and the vertical cable chases is provided by 3-hr fire walls. Fire stops are provided between elevations of the chases.

On el 288 ft 6 in and 306 ft 0 in, a 1 1/2-hr fire barrier is provided to separate the air conditioning equipment rooms and the corridors. Fire loading in the equipment rooms is 10 min or less and less than 1 min in the corridors. The separation provided between these areas based on fire loadings and available suppression systems is adequate.

Separation between the control room and relay room elevations is provided by a 3-hr rated floor. The relay room consists of power generation control complex (PGCC) floor modules, termination cabinets, and panels, similar to the control room arrangement. There are closed vertical cable trays which connect PGCC termination cabinets in the relay room to those in the control room. These trays will be provided equivalent protection to the PGCC termination cabinets. PGCC fire protection complies with the requirements of 10CFR50 Appendix R.

All areas of the building have at least two means of egress except as noted in Section 9.5.1.2.15. Stair towers are enclosed in 2-hr rated walls. Smoke removal capability is provided for all areas of the control building. Construction of the control room is discussed in Section 3.8.4.1.2.

Safety-Related Systems

The following table lists the safety-related equipment and its location in the control building.

	Division I <u>(el)</u>	Division II <u>(el)</u>	Division III <u>(el)</u>
Cable routing	214'-0" (W)	214'-0" (E)	244'-0" (S)
Cable routing	237'-0" (W)	237'-0" (E)	-
Battery room	261'-0" (W)	261'-0" (E)	261'-0" (S)

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Switchgear rooms	261'-0" (W)	261'-0" (E)	261'-0" (S)
HVAC equipment rooms	286'-6" (S)	306'-0" (S)	-

The computer room is nondivisional.

Post-fire Analysis

All divisional equipment and wiring on the lower three floors are separated from other divisions by 3-hr fire walls. For these areas, smoke detection and fire suppression (cable routing and switchgear rooms) have been provided. With fire protection systems in service, a fire would be contained within the area and extinguished. In the control room and relay room, Division I panels are located on the west side, and Division II and III panels are located on the east side. In the unlikely event of a fire in the control room or relay room severe enough to render these rooms uninhabitable, safe shutdown could still be accomplished from a separate fire area two floors below the control room.

The computer is not safety related and is not required to shut down the reactor.

Radioactive Release Analysis

The control building contains no radioactive material.

Fire Detection and Suppression

Each area of the control building is protected by a zoned, early-warning, ionization-type smoke detection system arranged to alarm locally and in the control room. Additional detection is provided for the PGCC. Ionization- and thermal-type detectors are provided in the PGCC subfloor area closer to the hazard than ordinary area detection.

Cable tray water sprinkler protection is provided for all cable trays in the control building, except as described in the following paragraphs, and sprinkler systems are provided at each floor for all cable tray chases. Cable tray chases are provided with fire stops at each floor. Switchgear rooms are provided with total-flooding CO₂ systems. Cable trays located within switchgear rooms do not have cable tray water spray protection. Automatic total-flooding Halon 1301 systems are provided for the wiring troughs located in the floor modules of the PGCC in both the control room and relay room.

No fixed suppression system is provided for the control room itself. Because the control room is continuously occupied and early-warning ionization detection systems are provided, fires would be detected early and extinguished with manual CO₂ and

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water hose reels in the vicinity. Portable extinguishers are also located in the control room.

An early-warning ionization detection system is provided in the relay room itself, inside the termination cabinets, and inside the closed, vertical cable trays which connect the control room and relay room PGCC termination cabinets, which alarms locally and in the control room. A removable section has been provided in the vertical cable tray cover to facilitate manual firefighting activities. Due to the close proximity of the relay room to the control room, frequent personnel access, and the detection systems provided, fires would be detected early and extinguished with CO₂ and water hose reels in the vicinity. Portable extinguishers are also located in the vicinity.

An automatic, total-flooding Halon 1301 system is provided for the computer room, including the area below the raised floor, and computers.

Detection is provided for the charcoal filter assemblies of the special filter trains located in the air conditioning equipment rooms.

Manual water hose reels and portable extinguishers are provided throughout the control building for backup protection.

Floor drains are described in Section 9A.3.5.1.12.

A combustible-free area exists in the HPCS cable routing area, E1-244' to further protect cables associated with 2CSH*MOV110 and 2CSH*MOV112.

9A.3.1.2.5.3 Electrical Tunnels

Introduction

There are four electrical tunnels provided for routing cables from the control building and normal switchgear building to the reactor building. The tunnels meet the reactor building at the 35-, 140-, 230-, and 315-deg radial points on the perimeter of the reactor building. Wiring in each tunnel is as follows:

35-deg tunnel	Division I, Nondivisional, and one reactor protection system (RPS) channel
140-deg tunnel	Division I and one RPS channel
230-deg tunnel	Division II and one RPS channel
315-deg tunnel	Nondivisional and one RPS channel

Division III wiring is routed from the control building to the reactor building in a buried duct bank.

The Division I and II tunnels are separated from each other, and all tunnels are separated from other areas of the plant by 3-hr fire walls.

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Smoke removal capability is provided for all electrical tunnels in accordance with BTP CMEB 9.5-1.

Each tunnel has two remote means of egress. Construction of the electrical tunnels is discussed in Section 3.8.4.1.7.

Safety-Related Systems

Safety-related wiring is separated as described above.

Post-fire Analysis

A fire in any tunnel will not result in loss of capability for safe shutdown. Since the fire loading in the electrical tunnels is 3 hr or less, the fire would not spread beyond the tunnel of its origin even if the fire protection systems were out of service. If the fire protection system were in service, the fire would be contained within the area and extinguished.

Radioactive Release Analysis

The electrical tunnels contain no radioactive material.

NOTE: 0 deg is west, 90 deg is north, etc.

Fire Detection and Suppression

Each tunnel is protected by an ionization-type smoke detection system arranged to alarm locally and in the control room. An automatic sprinkler system is provided for each tunnel.

Drainage is provided in each tunnel for removal of fire protection water. Details on drains are provided in Section 9A.3.5.1.12. Manual water hose reels and portable extinguishers are provided as backup protection.

9A.3.1.2.5.4 Turbine Building

Introduction

The turbine building has three elevations and is considered as a single fire area, since there are hoistways and stairways which are open between elevations. It is not feasible to seal or enclose these openings. The exterior walls below grade are concrete, and those above grade are metal panel construction.

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Three-hr rated enclosures have been provided around the following hazards:

1. Clean and dirty oil storage room.
2. Switchgear rooms.
3. Lube oil reservoir room.
4. Radwaste control room.

Walls of the turbine building that are common to other buildings are 3-hr fire rated, except the common wall between the turbine building and the cafeteria, which will be 2-hr fire rated.

On el 250 ft 0 in along the Am line between column lines 1 and 5 1/2, the wall between the turbine building and pipe tunnel is not rated. Additionally, this common pipe tunnel runs beneath the turbine screenwell, auxiliary boiler, radwaste condensate storage tank (CST) buildings, and the access passageway. The ceiling of this tunnel is not a rated fire barrier and has some unprotected openings between these areas and the common pipe tunnel. Based on the low fire loading, the automatic fire detection system, the tortuous path for fire propagation through the pipe tunnel, and the separation of redundant safe shutdown systems adjacent to the tunnel, the plant safe shutdown capability will not be affected by a fire in this area. A fire large enough to damage both adjacent buildings is not expected.

Two stairwells have been designated as egress stairs and have been provided with 2-hr rated enclosures.

Floor drainage is provided to drain fire protection water. Refer to Section 9A.3.5.1.12 for details on floor drains.

Fusible link-actuated heat vents are provided in the turbine building roof. Fusible links are set high enough to preclude release due to a steam leak. These vents are provided to reduce the possibility of roof collapse in the event of a fire on the operating level. Construction of the turbine building is discussed in Section 3.8.4.1.12.

Safety-Related Systems

The turbine building does contain some safety-related electrical equipment. However, this equipment is fail-safe and is not required for safe shutdown.

Post-fire Analysis

A fire in the turbine building will not result in loss of capability for safe shutdown. If the fire protection system were in service, the fire would be contained within the area and extinguished.

Radioactive Release Analysis

During normal operation, the opening of one heat vent does not result in a release of radioactivity because the exhaust fan maintains the turbine building at a negative pressure. In the event of a fire with multiple operation of the heat vents, the design objectives of 10CFR100 would not be exceeded.

Fire Detection and Suppression Systems

Each area of the turbine building is protected by a zoned, early-warning smoke detection system arranged to alarm locally and in the control room.

Automatic preaction sprinkler systems are provided for protection of general areas at el 250 ft 0 in and 277 ft 6 in.

A system of six automatically-operated foam water sprinkler systems (foam injection is manually controlled) covers the area and associated hazards under the turbine generator below el 306 ft 0 in. These systems would lay a blanket of foam on the floor under the turbine generator at el 277 ft 6 in to cover any accumulation of burning or unburned oil being discharged from a leak on the machine, and to flow down the sides of the machine and lay a blanket of foam in the condenser pit at el 239 ft 4 in.

The foam water sprinkler systems utilize open foam water sprinklers spaced to achieve area coverage in the vicinity of the turbine generator unit. The systems are actuated automatically by zoned heat detectors. The water supply to the systems is controlled by automatic flow control valves. The foam concentrate pump is manually started. Two equal capacity foam pumps are provided for the foam water sprinkler systems. One is on automatic standby. Two foam concentrate tanks are provided for foam water sprinkler systems and foam hose reels.

To assist manual firefighting around the turbine generator, the water hose stations in the vicinity of the unit are provided with piped foam concentrate so that either water or foam water streams are available at these stations. CO₂ hose reels are also provided.

CO₂ total-flooding systems are provided for switchgear rooms, the alternator exciter enclosure, and the lube oil reservoir (manual system for inerting vapor space). Automatic CO₂ systems have been placed in alarm only mode due to life safety concerns until modifications to improve personnel safety are completed.

Manual local application CO₂ systems are provided for turbine bearings and turbine lube oil piping above the turbine deck.

Manual water spray systems are also provided for these hazards as a backup to the local application CO₂ systems.

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Water spray systems are provided for the reactor feed pumps.

Cable tray water sprinkler systems are provided for turbine building cable trays except those in switchgear rooms and those that are protected by general area sprinkler systems.

The clean and dirty oil storage room and the lube oil reservoir have high fire loadings (see Section 9A.3.1.2.4). (These high fire loadings are due to the fact that total volume burning has been assumed. With fire barriers intact, the influx of combustion air would be restricted, which would limit the amount of oil actually burned.) The doorways are elevated to contain the oil in the event of a tank rupture. Because of the high fire loading, sprinkler systems have been provided for these areas. Backup protection is provided by manual water hose reels and portable extinguishers. Drains are described in Section 9A.3.5.1.12.

The hotwell pit has ample ponding capability to hold lube oil line break and expected water from firefighting.

9A.3.1.2.5.5 Diesel Generator Building

Introduction

The diesel generator building is a single-floor, concrete structure. It contains the two standby diesel generators and the HPCS diesel generator that provide power if both normal and preferred Station service power are lost.

Diesel generators are separated from each other by 3-hr fire walls. Diesel generator day tanks are located in separate rooms within the same fire area as their respective diesel generator. Doorways to day tank rooms have raised thresholds sized to contain the entire contents of the tank and water discharged for firefighting purposes in the event of a leak and subsequent fire.

A common ventilation exhaust chase is located on el 272 ft 0 in of the north end of the building. Discharge grills from each diesel generator room exhaust into the chase.

The fuel oil storage tanks are buried half under the diesel generator building and half under the access driveway.

Two means of egress are provided for each diesel generator room.

Construction of the diesel generator building is discussed in Section 3.8.4.1.3.

Safety-Related Systems

The diesel generator building contains the Division I and II and HPCS (Division III) diesel generators. These three generators

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provide power to essential equipment if both normal and preferred Station service power are lost.

Post-fire Analysis

The fire loading for the diesel generator room in the diesel generator building is 3 hr 37 min for Divisions I and II and 1 hr 27 min for the HPCS (Division III). This is based on a postulated fuel oil line rupture and the spilling of the entire contents of the fuel oil day tank into the diesel generator room.

Fire barriers between diesel generators preclude a fire in one division from disabling other divisions. Therefore, safe shutdown capability is assured.

If fire protection systems were in service, a fire would be extinguished.

Radioactive Release Analysis

There is no source of radioactivity in this building.

Fire Detection and Suppression

All diesel generators are protected with preaction sprinkler systems. The deluge valves for these systems open automatically on a signal from photoelectric detectors in the respective diesel generator rooms. Division I and II diesel generators as well as the HPCS (Division III) diesel generator have been modified to allow water spray without damaging the engine or generator.

Backup protection for the diesel generators are manual water and CO₂ hose reels and portable extinguishers.

The diesel generator day tank rooms each have a high fire loading (see Section 9A.3.1.2.4). Raised thresholds are provided so that the entire contents of the tank would be contained in the event of a tank rupture. If the entire contents of the fuel oil day tank were spilled in the diesel generator room, the fire loading would be 3 hr 37 min for Divisions I and II and 1 hr 27 min for HPCS (Division III), and a fire would be contained within that area. The floor drainage system is designed to drain oil to the oil separator outside the building.

Each of the floor drains is piped separately to the oil separator and cannot backfeed from one diesel to another. Smoke removal is provided for each diesel separately by the normal ventilation or by portable equipment.

9A.3.1.2.5.6 Screenwell Building

Introduction

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The screenwell building is constructed of metal siding. Rooms within the building containing safety-related equipment are constructed of reinforced concrete and have a 3-hr fire rating. The building has ample means of egress and access for firefighting personnel. Floor drainage is provided throughout.

Construction of the screenwell building is discussed in Section 3.8.4.1.4.

Safety-Related Equipment

Safety-related service water pumps are located in separate compartments in the screenwell building. Each division is separated from each other and other areas of the screenwell building by 3-hr fire walls.

The electric-driven fire pump and diesel engine-driven fire pump are located in separate rooms within the screenwell building. These pumps are not safety related. They are separated from each other and from other areas of the screenwell building by 3-hr fire walls. The 650-gal fuel oil storage tank for the diesel fire pump is located in the diesel fire pump room above a sump.

Post-fire Analysis

The average fire loading in the safety-related service water pump rooms is 40 min for service water pump room A and 42 min for service water pump room B.

Because of the separation previously described, no single fire could affect both the Division I and II service water systems. Therefore, safe shutdown could be accomplished.

Radioactive Release Analysis

There is no source of radioactivity in this building.

Fire Detection and Suppression

Each area is protected by an early-warning, smoke detection system arranged to alarm locally and in the control room.

An automatic sprinkler system is provided in the diesel fire pump room.

With the exception of the cable trays serving the safety-related service water pumps, all other cable trays in the screenwell building are nonsafety related. The screenwell building is a large, unobstructed building where cable trays are easily accessible for manual firefighting; the FHA does not justify fixed protection for cable trays.

The safety-related trays are located in the service water pump rooms; however, there is complete separation between redundant

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divisions by 3-hr fire walls. Fixed protection for these trays has not been provided.

Manual water hose reels and portable extinguishers are provided throughout the screenwell building.

Smoke removal is provided by normal ventilation, except for the service water pump bays which have a dedicated smoke removal fan.

9A.3.1.2.5.7 Radwaste Building

Introduction

The radwaste building is a concrete structure.

The east portion of the building, consisting of multiple elevations, is utilized for the processing and storage of radwaste. The west portion of the building is utilized for the processing of liquid radwaste. The east portion is separated from the west portion by a 3-hr rated fire wall.

On el 244 ft 0 in, barriers separating the radwaste building and the pipe tunnels are not rated. There is very low, if any, fire loading in the pipe tunnel and, in the event of a radwaste building fire, safe shutdown capability is not affected.

Egress is provided at the north end via a 2-hr rated stair tower, and at the south end through fire doors into the turbine building.

Construction of the radwaste building is discussed in Section 3.8.4.1.11.

Safety-Related Equipment

The radwaste building does not contain any safety-related equipment.

Post-fire Analysis

There is no equipment in this building required for safe plant shutdown.

Radioactive Release Analysis

The radwaste building ventilation system consists of one supply air system and two exhaust air systems.

A radiation monitor is provided in the reactor/radwaste building combined ventilation exhaust vent. The supply and exhaust systems are shut down manually when radiation levels exceed the preset limits.

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In the event of a fire, the ventilation system acts as a smoke exhaust system until radiation is detected in the exhaust duct and the ventilation system is subsequently shut down.

A fire in the radwaste building would not result in excessive leakage of airborne radioactivity.

Details of the radwaste ventilation system are provided in Section 9.4.3.

Fire Detection and Suppression

Each area of the radwaste building is protected by a zoned, early-warning detection system arranged to alarm locally and in the main control room.

Wet-pipe sprinkler systems are provided in the asphalt storage tank and recirculation pump rooms, liquid radwaste fiberglass tank areas, above cable tray runs, above the truck loading and solidified radwaste storage areas, and above the radwaste process areas.

Preaction sprinkler and deluge water spray systems are provided in process areas which are susceptible to asphalt spills and subsequent fires (deluge system) and in the dry compact waste area (preaction system).

The radwaste switchgear room is provided with a total-flooding CO₂ system.

The radwaste control room is provided with an automatic total-flooding Halon system.

Hose stations and portable extinguishers are provided throughout the building.

Drains are discussed in Section 9A.3.5.1.12.

9A.3.1.2.5.8 Normal Switchgear Building

Introduction

The normal switchgear building is a two-story concrete structure with a penthouse for mechanical ventilation equipment; one elevation is at grade and the other below grade. It houses nonsafety-related switchgear and nonsafety-related battery rooms. The switchgear portion of the building is divided into four major areas by 3-hr fire walls and floors. Battery rooms are also separated by 3-hr fire walls. Two means of egress are provided for all major areas of the building.

Battery rooms are ventilated to limit hydrogen buildup to 2 percent. Loss of ventilation and fan failure are annunciated in the control room.

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The ventilation system can be set to supply and exhaust 100 percent outside air and can be used as a smoke removal system. In addition, portable smoke removal equipment is available.

The exterior walls of the normal switchgear building are within 50 ft of exterior oil-filled transformers and have a 3-hr fire rating. The low-frequency motor generator (LFMG) is located on the roof penthouse. This equipment is nonsafety related and is protected by a detection system and manual hose reels.

Safety-Related Equipment

The normal switchgear building does not contain any safety-related equipment.

Post-fire Analysis

There is no equipment in this building required for safe plant shutdown.

Radioactive Release Analysis

There is no source of radioactivity in this building.

Fire Detection and Suppression

Each area is protected by an early-warning, smoke detection system arranged to alarm locally and in the control room.

The four switchgear areas are provided with total-flooding CO₂ extinguishing systems. Cable trays in switchgear rooms do not have water spray systems.

Manual water and CO₂ hose reels and portable extinguishers are provided for backup protection.

Drains are discussed in Section 9A.3.5.1.12.

9A.3.1.2.5.9 Auxiliary Boiler Building

Introduction

The auxiliary boiler building is a single-story structure with metal siding walls. It houses two electric boilers which are utilized during startup and shutdown. It has no interior walls and contains only small amounts of combustibles.

The ventilation system consists of outside air intake louvers and power roof exhaust fans.

Safety-Related Equipment

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The auxiliary boiler building does not contain any safety-related equipment.

Post-fire Analysis

There is no equipment in this building required for safe plant shutdown.

Radioactive Release Analysis

A fire in the auxiliary boiler building will not result in excessive leakage of airborne radioactivity; the design objectives of 10CFR100 would not be exceeded.

Fire Detection and Suppression

The building is protected by an early-warning, smoke detection system arranged to alarm and annunciate in the control room.

Since the FHA indicates a very low quantity of combustibles and since the area is easily accessible for manual firefighting, fixed protection has not been provided. Water hose reels and portable extinguishers are provided for complete building coverage.

Drains are discussed in Section 9A.3.5.1.12. Smoke removal is provided by normal ventilation and portable smoke removal units.

9A.3.1.2.5.10 Reactor Building

Introduction

Due to the presence of floor openings, the entire reactor building is considered a single fire area. Each floor elevation is considered a separate fire zone and each half of the building is considered as a fire subarea. The analysis of the contained hazards indicates that the average fire loading for each zone is 1 1/2 hr or less. A 20-ft-wide zone is provided between the north and south halves on the 0- to 180-deg line.

The 20-ft zone consists of two adjacent 10-ft zones with detection and automatic suppression systems.

To reduce the potential for the vertical spread of fire along cable tray risers, fire stops are provided for most vertical cable trays at each floor elevation. Refer to Figures 9A.3-2 through 9A.3-8 for the actual location of fire stops.

Elevation 353 ft 10 in separates fire subareas (FSA) 34 and FSA 35. From el 353 ft 10 in to el 409 ft 3 1/4 in, fire zone 281NZ contains in situ fire loading and equipment that supports the safe shutdown of the plant. This will have no direct effect on safe shutdown capability.

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The wall separating the reactor building from the radwaste pipe tunnel at the 196-ft and 227-ft elevations is a nonrated barrier which separates FA 55 and FSA 35. The radwaste pipe chase contains no combustible material.

The reactor building has a ventilation system utilizing 100-percent outside air for normal operation. This system will remove smoke in the event of a fire, as long as radiation levels remain below acceptable levels.

The primary containment is also considered one fire area. However, due to the low fire loading, primary containment inerting, and lack of continuity of combustibles, a fire that would spread from one hazard to another is not postulated.

Safety-Related and Reactor-Associated Systems

The following table includes both safety-related and reactor-associated systems and gives their locations in the reactor building.

<u>Safety-Related Systems</u>	<u>Location</u>
SFC* Fuel pool cooling pumps	289' (S)
SLS* Standby liquid control	289' (N)
HVR* Reactor building ventilation recirculation fans	289' (N)
Unit coolers	Multiple (N) (S)
ICS* Reactor core isolation cooling	175' (N)
HCS* Hydrogen recombiner	240' (N) (S)
RCS* Reactor recirculation pumps	Containment
CSH* High-pressure core spray	175' (S)
RDS* Control rod drive hydraulic control units	261' (N) (S)
<u>Reactor-Associated Systems</u>	<u>Location</u>
RDS Control rod drive pumps	215' (N)
CCP Reactor plant component	328' (N) (S)

* Category I equipment.

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cooling water pumps

WCS Reactor water cleanup 215' (N)
 pumps

Post-fire Analysis

With the following exceptions, Division I equipment is located in the north half of the reactor building and Division II equipment is located in the south half. Wiring for the following pumps, unit coolers, and valves is run in conduit and buried in the concrete floor slab, except at the connection point to the piece of equipment:

1. Both fuel pool cooling pumps are located in the south half; however, they are separated from each other and from the remainder of the plant by 3-hr fire walls and protected by fire detectors.
2. Both standby liquid control (SLC) pumps are located in the north half. This system is functionally redundant to the control rod drive (CRD) system. Cable trays in the area are protected by a sprinkler system and fire detectors.
3. Both reactor building ventilation emergency recirculation unit coolers are located in the north half at el 289 ft 0 in. The unit coolers are separated from each other by a concrete fire stop. Cable trays in the area are protected with a sprinkler system and fire detectors.
4. There are approximately 12 safety-related, motor-operated isolation valves in the reactor building that must be located out of their division. The analysis of Appendix 9B shows that sufficient equipment remains free of damage from a single fire to achieve safe shutdown of the plant.

The Division III pump (HPCS) is located in the south half of the reactor building; however, it is completely isolated by 3-hr rated fire walls. The Division III cables are provided from a separate buried ductbank outside the reactor building.

With the fire protection systems out of service, the low fire load, lack of continuity of combustibles, and the 20-ft fire break along the 0- to 180-deg line in the reactor building support the implausibility of fire spreading from the north half to the south half.

With the fire protection systems in service, it is unlikely that the fire would spread beyond the point of origin.

Radioactive Release Analysis

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The reactor building ventilation consists of a normal ventilation system and an emergency recirculation air system.

The normal ventilation exhaust from the reactor building is monitored for radiation by radiation monitors located in the exhaust duct. These monitors stop the normal ventilation system and activate the SGTS and the emergency recirculation system unit coolers.

Redundant trains are provided for the SGTS and emergency recirculation unit coolers. Standby gas treatment units are separated from each other by 3-hr rated fire walls, and recirculation unit coolers are separated from each other by fire barriers. Therefore, a single fire could not render both systems ineffective and a potential release of radioactivity to the environment would be prevented. Details of the reactor building ventilation systems are provided in Section 9.4.2. Smoke removal is provided by normal ventilation.

Fire Suppression and Detection

The required reactor building areas have zoned, early-warning detection systems arranged to alarm locally and in the control room. During periods of refueling and major maintenance, primary containment is equipped with general area smoke detection.

The reactor core isolation cooling (RCIC) pump room has an automatic deluge system initiated by a heat detection system.

Cable trays throughout the reactor building requiring protection are protected by one of two automatic closed-head cable tray sprinkler systems, one in the north half and one in the south half.

Each elevation has three or four water hose reels to reach all hazards with 100 ft of hose. Temporary hose reels are installed in the primary containment for fighting fires that might occur during refueling operations. Reactor building hose reel standpipes are fed from either of two connections to the yard main.

CO₂ hose reels are provided at major instrument racks and motor control centers (MCCs).

Portable extinguishers are provided throughout the reactor building.

Drains are discussed in Section 9A.3.5.1.12.

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Hatch area sprinkler protection (in accordance with NFPA-13, Section 4-4.8.2.3*), provided in the reactor building for the hoistway located at the 180° azimuth, is the only hatchway which requires protection to satisfy 10CFR50 Appendix R separation requirements.

Reactor building flood troughs are not sealed closed at the fire wall. As an alternate, sprinkler protection in accordance with NFPA-13 Section 4-4 is provided.

9A.3.1.2.5.11 Reactor Building Auxiliary Bays

Introduction

There are two auxiliary bays directly adjacent and part of the reactor building. One is located north of the reactor building and the other to the south. The auxiliary bays extend from el 175 ft 0 in to grade at el 261 ft 0 in. The auxiliary bays are separated from the reactor building by a 3-hr rated fire wall. Stairwells are enclosed in 2-hr fire-rated walls.

Safety-Related Systems

The following table lists safety-related systems and their location in the auxiliary bays:

System	Division I (el)	Division II (el)
Low-pressure core spray*	175' (N)	
Residual heat removal*	175' (N)	175' (S)
Reactor building ventilation*	Multiple (N)	Multiple (S)
Motor control centers	240' (N)	240' (S)
13.8-kV recirculation pump trip circuit breaker	240' (N)	240' (S)

Post-fire Analysis

Auxiliary bays are separate structures located at opposite sides of the reactor building. Division I equipment is located in the north auxiliary bay and Division II equipment is located in the south auxiliary bay. With the fire protection systems out of service, a fire could not spread from the north to the south auxiliary bay. With the fire protection systems in service, it is unlikely that a fire would spread beyond the point of origin.

* Sprinkler positioning relative to structural steel provides a level of protection equal to opening protection using draft stops. Draft stops are not required and not provided.

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Unit 2 can sustain the loss of either division and still safely shut down the reactor.

Radioactive Release Analysis

The auxiliary bays are served by the reactor building ventilation system. Further details are provided in Section 9A.3.1.2.5.10.

Fire Detection and Suppression

All areas of the auxiliary bays are protected by a zoned, early-warning detection system arranged to alarm locally and in the control room.

Cable trays requiring protection in the auxiliary bays are protected by one of the two automatic closed-head cable tray sprinkler systems that serve the reactor building.

Water hose reels are provided at each elevation in both the north and south auxiliary bays. Piping is designed so that cable tray systems and hose reels can be fed from separate connections to the yard main.

CO₂ hose reels are provided at el 240 ft 0 in to protect 13.8-kV switchgear and MCCs.

Portable extinguishers are provided throughout the building.

* Category I system.

Drains are discussed in Section 9A.3.5.1.12.

9A.3.1.3 Fire Suppression System Design Basis

9A.3.1.3.1 Backup

Total reliance is not placed on any single fire suppression system.

Water fire hose stations and portable extinguishers are provided throughout the plant as a backup to fixed suppression systems. In areas where hazards are switchgear or electrical cabinets, CO₂ hose reels and extinguishers are also provided.

9A.3.1.3.2 Single-Failure Criteria

All buildings housing safety-related equipment, except the diesel generator building, have a double connection to the fire loop. Piping is arranged so that a single pipe break would not impair both the fixed suppression system and the hose reels. In the event of a pipe break and subsequent fire in the diesel generator building, manual firefighting tactics using yard hydrants would be employed. The yard main is a loop with isolation valves

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located so that a single break in the loop does not impair fire protection systems in any building housing safety-related systems.

Redundant fire pumps are provided. One pump is electric driven and the other is diesel driven.

9A.3.1.3.3 Seismic Design Basis

Standpipes and hose connections for manual firefighting are seismically supported in safety-related areas and in areas containing safety-related equipment. The design bases do not contemplate simultaneous earthquake and fire conditions; additionally, Unit 2 is not in an area of high seismic activity; therefore, these requirements were not incorporated into the design.

9A.3.1.3.4 Design Basis Analysis

General Design Criteria (GDC) 3 requires that firefighting systems be designed to ensure that rupture or inadvertent operation does not significantly impair the safety capability of structures, systems, and components important to safety. Redundant trains of components required for safe shutdown that are susceptible to damage from water spray are physically separated so that manual fire suppression activities will not adversely affect the operability of components not involved in the postulated fire. Where necessary, appropriate protection is provided to prevent impingement of water spray on components required for safe shutdown. Section 3C.4 provides further details regarding the effects of spraying on safe shutdown components. Automatic suppression systems have been designed and located so that operation of the systems, either intentionally or inadvertently, will not cause damage to redundant trains of components required for safe shutdown.

The FHA that is included as part of the FSAR defines the effects of postulated fire outbreaks. Details for the effects and analyses for wind and tornado loading, water level (flood), and missile protection are described in Sections 3.3, 3.4, and 3.5.

9A.3.1.3.5 Moderate-Energy Line Break Analysis

The consequences of a crack in a moderate-energy line in the fire suppression system are included in the energy pipe break analysis for Unit 2 (refer to FSAR Section 3.6A).

9A.3.1.4 Alternative or Dedicated Shutdown

Refer to FSAR Appendix 9B.

9A.3.1.5 Implementation of Fire Protection Programs

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1. The fire protection programs for buildings needed to store new fuel and the adjacent areas were completed 90 days prior to fuel loading. Preplans, surveillance testing, and training of the Fire Department members were completed, and firefighting equipment was in place prior to fuel load.
2. The fire protection program for Unit 2 has been implemented 90 days before fuel loading. Fire Department personnel responsible for fire rescue and first aid, concurrent with training and writing preplans, procedures, tests and other necessary documents, were assigned prior to fuel load.

9A.3.2 Administrative Procedures and Controls

Procedures similar to those presently in effect at Unit 1 have been developed for Unit 2 and comply with BTP CMEB 9.5-1, Section C.2, Items A through O. Responsibility for control and maintenance of these procedures is as delineated in Table 13.5-1. The administrative controls for fire protection consist of the fire protection organization, the Fire Brigade training, the controls over combustibles and ignition source, the prefire plans and procedures for fighting fires, surveillance and maintenance of fire protection features, and QA.

Each surveillance requirement shall be performed within the specified surveillance interval with a maximum allowable extension not to exceed 25 percent of the specified surveillance interval. This permits an allowable extension of the normal surveillance interval to facilitate surveillance scheduling and consideration of plant operating conditions that may not be suitable for conducting the surveillance (e.g., transient conditions or other ongoing surveillance or maintenance activities). It is not intended that this provision be used repeatedly as a convenience to extend surveillance intervals beyond that specified for surveillances that are not performed during refueling outages. The limitation of this allowance is based on engineering judgment and the recognition that the most probable result of any particular surveillance being performed is the verification of conformance with the surveillance requirements. This provision is sufficient to ensure that the reliability ensured through surveillance activities is not significantly degraded beyond that obtained from the specified surveillance interval.

9A.3.3 Fire Brigade

A Fire Brigade of five members, as described below, shall be maintained onsite at all times to respond to fire emergencies. Fire Brigade composition may be less than the minimum requirements for a period of time not to exceed 2 hr in order to accommodate unexpected absence, provided immediate action is taken to fill the required positions.

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The Fire Brigade shall not include the Shift Manager (SM) and the two other members of the minimum shift crew necessary for safe shutdown of the unit, and any personnel required for other essential functions during a fire emergency.

As a minimum, a site Fire Brigade consisting of five Brigade members is assigned rotating shifts with fire and rescue responsibilities. The ability to pass an annual physical examination is required for Fire Brigade members.

Personal protective equipment such as turnout coats, boots, gloves, and helmets are provided for Brigade members. In addition, approved self-contained breathing apparatus (SCBA) is provided. Complete sets of equipment are stored at various locations throughout the plant as approved by the Supervisor Fire Protection.

An approved breathing air compressor is presently in use for SCBA bottle refilling; in addition, a bottle cascade system is available.

Fire Brigade members are trained in accordance with approved training procedures. This training program is intended to ensure that the Brigade Leader and at least two members shall have sufficient training and a knowledge of plant safety-related systems to understand the effects of fire and fire suppression on safe shutdown capability.

Technical training for Firefighters and Fire Brigade Leaders consists of classroom sessions and in-plant inspections showing site specifics covering the subjects, as outlined in the approved training program.

Station practical training for Firefighters and Fire Brigade Leaders shall consist of on-the-job training (OJT), fire drills, training exercises and demonstrations, lecture and tours. Firefighters and Fire Brigade Leaders are given an assignment which will provide for regular participation in day-to-day firefighting duties. The assignments are developed to demonstrate that the trainee exercises necessary skill and knowledge prior to assuming responsibility for tasks which involve such expertise.

Drills for Fire Brigade members are performed quarterly. Each Fire Brigade member should participate in each drill, but must participate in at least two drills per year. At least one drill per shift will be unannounced to determine the firefighting readiness of the Fire Brigade, fire protection systems, and equipment.

All members of the Fire Brigade attend a company-approved fire school annually. This school provides Firefighters and Fire Brigade Leaders with experience in actual fire extinguishment and

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the use of emergency breathing apparatus under strenuous conditions.

Training records and individual training manuals for each Firefighter and Fire Brigade Leader contain information regarding system/equipment operation, surveillance tests, required reading, lectures attended, fire drills attended, and transcripts of any off-night training and results.

9A.3.4 Quality Assurance Program

The QA Program for fire protection is part of the overall QA Program, and applies the criteria of BTP APCSB 9.5-1 Appendix A, dated August 23, 1976. Elements of the Quality Assurance Program, as described in the QATR, are implemented for the Fire Protection Program as described below:

1. Design Control Design control for fire protection systems, equipment and components is performed in accordance with the following:
 - a. Design information (e.g., drawings, specifications and standards) is maintained to ensure that items are designed to the applicable requirements. Applicable work documents invoke design documents as necessary to ensure proper fabrication, inspection and testing.
 - b. Design document changes, including field changes and design deviations, are subject to the same level of control, review and approval that was applied to the original design document. Modifications are performed in accordance with the current plant modification program.
 - c. Quality standards are specified in the design documents. Appropriate fire protection codes and standards are incorporated in the design documents. Deviations and changes from these design documents are controlled and require approval of the specifying organization.
 - d. New designs and plant modifications are controlled and reviewed by qualified personnel to assure inclusion of appropriate fire protection requirements. These reviews are performed by selected personnel in accordance with implementing procedures.
2. Procurement Document Control The procurement document control requirements discussed in the applicable section of the QATR apply to the Fire Protection Program. Fire protection items are procured as specified in design documents. Items specified as

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requiring a listing by an industry organization, such as Underwriters' Laboratories or Factory Mutual, will be procured with the required listing mark. Design, test, inspections and documentation requirements are included in procurement documents as necessary to assure that the item will perform its intended function. Personnel preparing procurement requirements incorporate these requirements. Input from a Fire Protection Engineer is obtained, as necessary, to accurately define the requirements.

3. Instructions, Procedures, and Drawings Inspections, tests, administrative controls, fire drills and training required by the Fire Protection Program are accomplished in accordance with approved instructions, procedures or drawings.
4. Control of Purchase Material, Equipment and Services Assurance that a fire protection item will perform its intended function is obtained using one or a combination of the following methods:
 - a. When an item is listed by an industry-recognized testing laboratory, it is verified that the appropriate label is applied.
 - b. Supplier qualification may be performed to establish that a supplier has the necessary controls in place to assure the items comply with procurement requirements.
 - c. Source surveillance/inspection and/or receipt inspection is performed on selected attributes which provide confidence that the item is satisfactory.
 - d. Post-installation testing of an item for critical characteristics which provide confidence that the item will perform its intended function.

General use items not procured specifically for fire protection applications may be used in fire protection applications. This includes items such as standard hardware items and gaskets. The attributes which require verification are selected by an engineering evaluation. Sample plans may be used which are commensurate with the application of the item. The above functions are performed in accordance with procedures which govern these activities. After acceptance, items are controlled to prevent degradation during storage. Where specific applications are identified, controls are used to prevent misapplication.

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5. Inspection A program for inspection and surveillance, as required, for activities affecting fire protection is established to the requirements of the applicable sections of the QATR to verify conformance to documented installation drawings and test procedures. The program includes inspection and surveillance of:
 - a. Installation, maintenance and modification of fire protection systems.
 - b. Emergency lighting and communication equipment.
 - c. Penetration seals and fire-retardant coating.
 - d. Cable routing.
 - e. Fire barriers.
 - f. Emergency breathing apparatus and auxiliary equipment.
6. Test Control A test program is established for fire protection systems, equipment and components, and has been implemented to ensure that test requirements are satisfied and that systems conform to design and licensing documents, as applicable. The tests are performed in accordance with written test procedures at a frequency specified by the test program. Test results are documented, evaluated, and their acceptability determined by a qualified individual or group.
7. Control of Measuring and Test Equipment Validity of inspection, surveillance and test results for fire protection systems, equipment and components is assured through the use of appropriate measuring and test equipment of the range, validity and type necessary to determine conformance to requirements. At intervals established to ensure continued validity, measuring devices are verified or calibrated, if appropriate, against certified standards that have a known, valid relationship to national standards.
8. Inspection, Test, and Operating Status Measures are established to provide for the identification of fire protection items that have satisfactorily passed required tests and inspections. These measures include provisions for identification by means of tags, labels, documents directly traceable to the affected items, or similar temporary markings to indicate completion of required inspections and tests. Operating status may also be indicated by any of the foregoing means, consistent with plant operating procedures.

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9. Nonconforming Materials, Parts or Components Measures are established to control fire protection materials, parts or components that do not conform to specified requirements. The identification (tagging or marking), documentation, segregation, review, disposition and notification to the affected organization of nonconforming materials, parts or components is procedurally controlled.
10. Corrective Actions Conditions adverse to fire protection such as failures, malfunctions, deficiencies, deviations, defective components, uncontrolled combustible material and nonconformances are promptly identified, reported and corrected. Documentation describes the condition adverse to fire protection, the nonconforming item, and records the corrective action taken.

9A.3.5 General Plant Guidelines

9A.3.5.1 Building Design

9A.3.5.1.1 Fire Barriers

All fire barrier assemblies, including walls, floor/ceilings, cable tray enclosures and other fire barriers, separating safe shutdown fire areas or separating portions of redundant systems important to safe shutdown within a fire area, and all sealing devices in fire-rated assembly penetrations, including fire doors, fire dampers, cable and piping penetration seals, shall be operable at all times.

Action

With one or more of the above-required fire-rated assemblies and/or sealing devices inoperable, within 1 hr implement one of the following actions:

1. Establish a continuous fire watch on one side of the affected assembly(s) and/or sealing device(s), or
2. Verify the operability of fire detectors on both sides of the inoperable assembly(s) and/or sealing device(s) and establish a daily inspection of the inoperable fire-rated assembly(s) and/or sealing device(s) to verify no increase in fire hazards within the vicinity, or
3. Verify the operability of fire detectors on one side of the inoperable assembly(s) and/or sealing device(s) and establish an hourly fire watch patrol, or
4. Implement a preplanned provision(s) in accordance with the assessment of a qualified Fire Protection Engineer.

Surveillance Requirements

Each of the above-required fire-rated assemblies and penetration sealing devices shall be verified operable at least once per operating cycle, plus a maximum of 25 percent of one operating cycle, by performing a visual inspection of:

1. The exposed surfaces of each fire-rated assembly.
2. At least 10 percent of the above-required fire dampers shall be verified operable under normal conditions (except where normal conditions are not feasible, due to radiological and/or industrial safety concerns, in which case alternative conditions shall be as prescribed by the fire protection engineer) by removal of the fusible link and observing closure of the associated damper. If a damper fails to close, an additional 10 percent shall be tested until a 10-percent sample with no failures is found. Samples shall be selected so that each fire damper will be inspected at least once every 10 cycles.
3. At least 10 percent of each type of sealed penetration except internal conduit seals. If significant changes in appearance or abnormal degradations are found, a visual inspection of an additional 10 percent of that type of sealed penetration shall be made. This inspection process shall continue until a 10-percent sample with no significant changes in appearance or abnormal degradation is found. Samples shall be selected so that each penetration seal will be inspected at least once every 10 cycles.

Each of the above-required fire doors shall be verified operable by inspecting release and closing mechanism and latches at least once per 6 months, and by verifying:

1. At least once per 7 days that each locked-closed fire door is closed.
2. At least once per 24 hr that doors with release mechanisms are free of obstructions and performing a functional test of these mechanisms at least once per 18 months.
3. At least once per 24 hr that each unlocked fire door is closed.

The operability of the fire barriers and barrier penetrations ensures that fire damage will be limited. These design features minimize the possibility of a single fire involving more than one fire area before it is detected and extinguished. The fire barriers, fire barrier penetrations for conduits, cable trays and

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pipings, fire dampers, and fire doors are periodically inspected to verify their operability.

Fire barriers with a fire resistance rating of 1, 2, and 3 hr are provided to separate:

1. Safe shutdown fire areas from nonsafety-related fire areas.
2. Fire areas with required redundant divisions of safe shutdown systems, components, or cables from each other. In most cases, this is accomplished with 3-hr rated fire barriers. However, within some areas (e.g., the reactor building and primary containments) safe shutdown cables and equipment are spatially separated by locating them on opposite sides of the structures in accordance with the requirements of 10CFR50 Appendix R.

Appendix 9B evaluates the Unit 2 physical separation characteristics with regard to equipment, cabling, controls, and instrumentation required for shutdown.

3. Certain significant hazards within each safety-related division, e.g., divisional switchgear and safety-related pumps.
4. Unit 2 from Unit 1.

The administration building and access tunnels shared between Unit 1 and Unit 2 are separated by 3-hr fire barriers at interface points.

(Unit 2 is physically separated from the James A. FitzPatrick plant.)

The walls and floor/ceiling barriers, used to enclose rooms containing safety-related systems and components, are constructed of a minimum of 8-in thick reinforced concrete. Concrete, in addition to its capability to support various loads, also possesses insulating and fire-resistive properties.

Nationally known and recognized Uniform Building Code (1982 edition) (herein called UBC) lists the required minimum thicknesses of various insulating materials for fire-resistive periods of 1 hr through 4 hr listed in Tables 43A, B, C. Based on these tables, it can be concluded that all fire barriers provide a minimum of 3 hr of fire resistance rating as specified for certain plant areas. The reinforcing steel with a minimum of 1 in of concrete cover also provides 3 hr of fire resistance rating.

American Concrete Institute (ACI) codes and QA requirements of ANSI N45.2.5, as invoked by NRC RG 1.55 and 1.94, respectively, are used in the design, procurement, and construction of these

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barriers. Penetration seals are discussed in Section 9A.3.5.1.2. Comparisons are performed for:

1. Typical floor system versus corresponding Underwriters' Laboratories (UL)-rated sections.
2. Typical steel beam versus corresponding UL-rated beam.
3. Typical wall section versus corresponding UL-rated sections.

The details of UL-rated sections are obtained from the Fire Resistance Directory, published by the Underwriters' Laboratories, dated January 1983. Tables 9A.3-13, 9A.3-14, and 9A.3-21 provide the comparison.

Therefore, while fire testing is not done, the required 3-hr fire resistance is provided.

Structural steel, used to support fire barriers in the reactor building and other safety-related areas, is evaluated or protected in accordance with one of the following criteria:

1. The steel is provided with UL-listed, 3-hr rated fireproofing.
2. The steel is protected by sprinklers in accordance with NFPA-15, Section 4-4.3.3.
3. The steel can fail and not affect safe shutdown. This is based upon a structural analysis which assumes that all of the unprotected structural steel within the fire area has reached the yield point due to elevated temperature produced by a postulated fire. The resulting structural failure is so combined as to not affect the redundant systems necessary for plant shutdown.
4. The steel is evaluated in accordance with the professional loss control method and if:
 - a. It fails and it is provided with protection as described in Items 1 and 2 above.
 - b. It fails and its failure is accepted and documented in accordance with Item 3 above.
 - c. It does not fail.

NOTE: Methodology and results of analysis are kept on file in an auditable form.

9A.3.5.1.2 Penetration Seals

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Openings through fire barriers for pipe, conduit, and cable trays which separate fire areas are sealed to provide a fire rating equal to the rating of the barrier itself, or have been evaluated to provide an adequate level of protection. Openings inside conduit larger than 6 in in diameter are sealed at the fire barrier penetration or at the first opening on both sides of the barrier with a fire-rated seal. Openings in conduit 6 in in diameter or less are sealed with a fire-rated seal or noncombustible seal at the fire barrier penetration or at the first opening on both sides of the barrier, except in the following configurations where no seal is required:

- Conduit that terminates in closed junction boxes or other noncombustible enclosures.
- Conduit 2 in in diameter with a cable fill of 40 percent or greater that terminates 3 ft or greater from the fire barrier.
- Conduit between 1 in and 2 in in diameter with a cable fill of 40 percent or greater that terminates 3 ft or greater from the fire barrier.
- Conduit 1 in in diameter with a cable fill of less than 40 percent that terminates 5 ft or greater from the fire barrier.
- Conduit smaller than 1 in in diameter that terminates 1 ft or greater from the fire barrier.
- Conduit 1 in in diameter with a cable fill of 40 percent or greater that terminates 1 ft or greater from the fire barrier.

The cable penetration fire stop and seal materials and design shall meet the requirements of ANSI/IEEE-634. All cable fire stops and seals shall allow easy installation of future cable without damage to existing cable and invalidating compliance with IEEE-634 and ANI/MAERP approvals. They provide 3-hr rating and demonstrate the following:

- No significant smoke or hot gas penetration.
- No large areas of heat rise greater than 325°F above ambient on the cold side. (In most cases, maximum cold side temperature did not exceed 325°F.)
- No hot spots that could ignite nearby cable on the cold side.
- Capability to withstand the design differential pressure which is not concurrent with fire.

The following materials, or an approved equal, may be used:

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- Dow Corning 3-6548 silicone RTV foam.
- Dow Corning Sylgard 170 products A and B, Elastomer.

To facilitate installation, a fire-rated damming material is used when required. Installation of the conduit internal seals is performed by ANI-approved installers based on procedures consistent with the tests conducted. Threaded unused conduits are capped or plugged on both sides of the fire barrier with a 1/8-in vent hole provided on one side. Cable trays are supported in a manner similar to the UL test. Unit 2 penetration seal designs are not the same as Unit 1 designs, but were tested and qualified by Underwriters' Laboratories for a 3-hr rating, or are based on approved and tested designs (using ASTM E119 and ANI test criteria), or are UL-listed 3-hr rated penetration seals (such as link seals). This is verified in accordance with the QA requirements.

9A.3.5.1.3 Penetration Openings for Ventilation Systems

Openings through fire barriers for ventilation systems are protected by UL-labeled fire dampers with a rating equivalent to that required of the barrier. Flexible air duct coupling in ventilation and filter system is noncombustible.

9A.3.5.1.4 Door Openings

With the exception of special doors such as pressure-tight, watertight, radiation shielding, oversize equipment, tornado, and railroad access, the doors installed in the fire-rated assemblies are UL-labeled fire doors. To meet tornado and watertight design conditions, door C-239-1 is installed in a nonfire-rated assembly. Two doors, R289-9 and SW261-10, are UL fire-rated doors. However, due to other design considerations the installation does not meet UL standards. Figures 9A.3-14, 9A.3-21, and 9A.3-22 show installation details for these doors. Table 9A.3-16 lists pressure-tight, watertight, radiation shielding, oversize equipment, tornado, and railroad access doors to be installed in fire barriers and the corresponding fire loading on either side of each door. Figures 9A.3-14 through 9A.3-24 show typical sections and details of each door type. Expansion gaps have been provided at the periphery of each door. No significant deformation or warping of door panels which could allow fire propagation is expected. Table 9A.3-17 provides a comparison between UL-labeled Class A rated fire doors and Unit 2 nonlabeled doors. Fire door position will be monitored and verified to be maintained in accordance with BTP CMEB 9.5-1 Section C.5.a(5). Installation of fire doors is in accordance with NFPA-80 and applicable UL requirements.

9A.3.5.1.5 Personnel Access and Escape Routes

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Two means of egress are provided from each fire area except as noted in Section 9.5.1.2.15.

Enclosed stairwells required for egress are designed to minimize smoke infiltration and to provide a safe means of egress in the event of a fire. Exit routes are clearly marked. The enclosures are designed for a 2-hr fire rating and equipped with UL-listed, self-closing Class B fire doors. Elevator enclosures and chutes are similarly designed.

9A.3.5.1.6 Sharing of Cable Spreading Rooms

Unit 2 does not share a cable spreading room with Unit 1.

9A.3.5.1.7 Structural Components

Interior wall and structural components, thermal insulation materials, radiation shielding materials, and soundproofing are all noncombustible or are appropriately protected. All interior finish materials have flame spread, smoke, and fuel contribution of 25 or less and are listed or approved by Underwriters' Laboratories or Factory Mutual, with the exception of the following:

1. Resilient floor coverings (ASTM Standard E-84) used in office areas, with a flame spread rating of 75 or less.
2. Control room carpet (not subjected to ASTM E-84 testing) with NFPA-253 rating of 0.59 watts/cm² (which exceeds NFPA-101, Class I, interior floor finish requirements) and NFPA-258 rating of 421 Dm (corr.)^{*}.

9A.3.5.1.8 Roof Construction

Metal deck roof construction, where used, is designed as a Factory Mutual Class 1 roofing system.

9A.3.5.1.9 Suspended Ceiling

Any suspended ceilings in safety-related areas are of noncombustible construction. Concealed spaces are void of combustibles except for electrical cable, which is in metallic conduit.

9A.3.5.1.10 Transformers

Transformers located within safety-related areas are of the dry type.

9A.3.5.1.11 Oil-Filled Transformers

^{*} Corrected optical density.

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The plant has an open transformer yard, which contains all the oil-filled transformers applicable to BTP CMEB 9.5-1 Section C.5.a(13). The west wall of the control building is located within 50 ft, has one protected heating, ventilating, and air conditioning (HVAC) air intake opening, and is constructed in excess of the 3-hr fire-resistive requirements. Protection consists of a fire damper (located 6 ft downstream of the opening) and missile resistance construction with a geometric orientation that provides sufficient assurance that a transformer fire would be highly unlikely to breach the fire barrier boundary provided by the west building wall. Additional unprotected openings exist that are in excess of 50 ft from the transformers.

9A.3.5.1.12 Floor Drains

Floor drains are conservatively sized in accordance with the National Plumbing Code. Floor drains in safety-related and nonsafety-related areas are approximately spaced at one drain per 575 sq ft, each with a capacity of approximately 70 gpm. Actual drainage capability would depend on drain spacing, location, and area involved.

Firefighting water flow depends on the type of suppression system provided, system design density, and area of involvement. Unit 2 fixed water suppression systems incorporate the use of closed sprinklers and closed-water spray nozzles which limit the amount of water discharged to the area of involvement during a fire.

An evaluation to determine the degree of buildup and its effect was conducted for the diesel generator rooms (the most conservative case). The result showed that with all sprinkler heads operating and 300 gpm hose stream discharge, the buildup would be contained by the curbs provided at the doorways.

The maximum firefighting water flow for the diesel generator building exceeds the maximum firefighting water flow (and subsequent buildup due to compartment size) for all other safety-related areas.

Based on an evaluation of this water flow and the results of the analysis described in Section 3C.5, Compartment Flooding as a Result of Breaks or Cracks, firefighting water flow and subsequent buildup will be removed by floor drains and not cause the loss of redundant trains of equipment required for safe shutdown for all other safety-related areas.

In areas containing combustible liquid storage and piping containing combustible liquids, traps or sumps are provided in the floor drains. Curbs and floor drains are provided and sized to contain the largest spill, in addition to the expected firefighting water flow, for a duration of 10 min.

Areas protected by total-flooding gaseous suppression systems are not provided with floor and equipment drains.

9A.3.5.2 Safe Shutdown Capability

9A.3.5.2.1 Safe Shutdown Fire Protection Features

Fire protection features, including separation, rated barriers, and suppression and detection systems, are provided for structures, systems, and components required for safe shutdown. Refer to Section 9A.3.6 for details on fire suppression and detection equipment.

Appendix 9B describes the methodology used to assemble, analyze, and document the ability of Unit 2 to conduct a safe shutdown following a fire. Safe shutdown implies that one minimum set of systems and components, of one train or combination of trains, is available to achieve hot shutdown performance goals immediately with manual operations, restore/repair normal capability to begin cold shutdown within 72 hr, or the alternate capability to achieve cold shutdown within 72 hr.

9A.3.5.3 Alternative or Dedicated Shutdown Capability

Refer to Appendix 9B.

9A.3.5.4 Control of Combustibles

9A.3.5.4.1 Safety-Related Systems

The emergency diesel generator oil tanks, turbine generator oil and hydraulic control fluid systems, and reactor coolant pump lube oil system are discussed in Sections 9A.3.7.10, 9A.3.7.8, and 9A.3.7.1.1.5, respectively. Control of transient combustibles that would expose safety-related equipment and systems is described in Section 9A.3.2.

9A.3.5.4.2 Bulk Gas Storage

Hydrogen is stored outside the turbine building, and it does not pose a danger to any safety-related structure. The axis of the hydrogen storage rack is north-south, west of safety-related structures.

9A.3.5.4.3 Use of Plastic Materials

No polyvinyl chloride (PVC) cable construction has been used. Cable meets or exceeds the IEEE-383 test. The chemical feed-hypochlorite system and the service water chemical treatment (SCT) system, located in the screenwell building (water treatment area), incorporates the use of PVC piping and PVC-coated flexible metal conduit. Area fire detection which alarms locally and in the control room is provided throughout the area. Other uses of plastic materials have been limited.

9A.3.5.4.4 Flammable Liquids

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The plant stores flammable liquids in full compliance with NFPA Standard No. 30, Flammable and Combustible Liquids Code. Refer to Section 9A.3.2 for administrative control.

9A.3.5.4.5 Hydrogen Lines in Safety-Related Areas

There are no hydrogen lines in safety-related areas.

9A.3.5.5 Electrical Cable Construction, Cable Trays, and Cable Penetrations

9A.3.5.5.1 Cable Tray Construction

All cable tray and raceway construction is noncombustible. Only metallic tubing is used for conduit, with the exceptions noted in Section 9A.3.5.4.3.

9A.3.5.5.2 Cable Spreading Rooms

Although Unit 2 does not have a conventional cable spreading room, the relay room has been identified to contain safety-related equipment and cables of redundant divisions which could be subject to damage from a single fire. The protection for the relay room is described in Section 9A.3.1.2.5.2.

9A.3.5.5.3 Cable Tray Fire Protection

Safety-related cable trays are provided with automatic water sprinkler systems of either the preaction, wet-pipe sprinkler type or wet-pipe systems with directional nozzles, except for single cable tray stacks less than five deep (vertically). Cable is designed for wetting down without electrical faulting. Single cable tray stacks less than five deep (vertically) without water sprinkler protection, as well as all protected cable trays, are provided with early-warning smoke detection, alarmed and annunciated in the control room. Multiple tray stacks which are within the zone of influence of each other and exceed three deep (vertically) are protected the same as single tray stacks over five deep (vertically). Manual hose stations are available throughout the plant. Portable extinguishers provide additional backup protection.

9A.3.5.5.4 Electric Cable Construction

Electrical cable construction meets or exceeds the IEEE-383-1974 flame test.

9A.3.5.5.5 Cable Trays and Raceways

Cable trays, raceways, and conduit are used only for cables. Buried cable is in conduit/duct systems in trenches used only for this purpose. Administrative controls (Section 9A.3.2) limit

potential exposure hazards to safety-related cables, cable trays, and penetrations.

9A.3.5.5.6 Hydraulic Snubbers

Hydraulic pipe snubbers may have been added to certain areas of the plant as replacement for mechanical pipe snubbers. As consideration of this, the fire hazard analysis considers the associated synthetic hydraulic fluid as being present in the applicable fire zones.

9A.3.5.6 Ventilation

9A.3.5.6.1 Products of Combustion

All safety-related areas use the installed once-through ventilation to remove products of combustion. The electrical tunnels, the control building, and the normal switchgear building have separate smoke exhaust fans, isolation dampers, and controls dedicated to smoke removal. Portions of the normal ventilation system components are used in certain areas for smoke removal. Fire dampers are provided where ventilation ductwork penetrates fire barriers. For large (high-heat) fires, the fire dampers would close. These dampers can be manually reopened by plant personnel for smoke removal. Location and operation of smoke removal dampers will be shown on individual preplan procedures for each area of the plant. Monitors are provided in the reactor building, turbine building, and radwaste building exhaust ductwork to determine if the release is within the permissible limits of radioactivity to prevent an unacceptable release to the atmosphere. Additional heat removal capability is supplied by roof-mounted heat vents installed in the turbine building, electrical bay, heater bays, service building, screenwell building, auxiliary service building, clean access area, demineralizer storage tank building, SGT building, chilled water building, and intake and discharge shafts building. Portable fans would be used to further aid in the removal of smoke.

9A.3.5.6.2 Smoke or Corrosive Gases

The inadvertent operation or single failures of ventilation systems designed to exhaust smoke and/or corrosive gases will not violate controlled areas of the plant resulting in radioactivity release. Manual smoke exhaust systems will not be activated if area radioactivity is high. This is accomplished by using area radiation monitors that alarm and annunciate in the control room.

9A.3.5.6.3 Power Supply and Controls

The power supply and controls for ventilation systems are generally outside the area served except for equipment located in fire zone nos. 612XL, 613XL, 752NZ, 251NW, 255SW, 351NZ, 906NZ, 390XG, and 395XL. In the event that a fire occurs which disables

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ventilation equipment in one of those zones, portable fans would be used for smoke removal purposes.

9A.3.5.6.4 Fire Suppression Systems

Manually-actuated water suppression systems are provided in all engineered safety feature (ESF) charcoal filters used for removing radioactive iodine. Actuation is locally controlled. Temperature detection is provided for these charcoal filters.

9A.3.5.6.5 Fresh Air Supply Intakes

Fresh air supply intakes to areas containing safety-related equipment or systems are remote from the exhaust air outlets and any smoke vents of other fire areas.

9A.3.5.6.6 Stairwells

Enclosed stairwells required for egress are designed to minimize smoke infiltration and to provide a safe means of egress in the event of a fire.

9A.3.5.6.7 Flooding Gas Extinguishing Systems

Total-flooding gas extinguishing systems are interlocked with ventilation systems to close dampers in duct penetrations upon initiation of gas flow, or shut down ventilation equipment upon detector signal.

9A.3.5.7 Lighting and Communication

9A.3.5.7.1 Lighting

Lighting in areas required for safe shutdown is powered by one or a combination of normal, essential, emergency, and 8-hr battery-pack lighting systems. Details of the Station lighting systems are provided in Section 9.5.3. The foot-candles provided at the floor level of access routes and operational areas are included in conjunction with the Appendix R evaluation. Refer to Appendix 9B, Section 9B.10.

9A.3.5.7.2 Battery-Powered Lights

Battery-powered portable hand lights have been provided for use by the Fire Brigade and other operations personnel required to achieve safe plant shutdown.

9A.3.5.7.3 Emergency Communications

The plant emergency communications consist of a page party/public address (PP/PA) system with emergency evacuation signals and other emergency alarms throughout the plant, a maintenance and calibration communication (M/CC) system with plug-in jack outlets throughout the plant, a dc power supply and portable headsets, and a sound-powered communication (SPC) system that utilizes

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portable sound-powered headsets and does not require any plant electrical power. Details of these systems are given in Section 9.5.2.

9A.3.5.7.4 Portable Radio Communications

The portable radio communication system utilizes hand-held portable radios operated on VHF band frequencies. The radios are powered by rechargeable batteries. A preoperational test will be conducted to ensure that the frequencies used for portable communications systems will not affect the actuation of protective relays. If repeaters are used, they will be suitably protected from exposure to fire damage.

9A.3.6 Fire Detection and Suppression

9A.3.6.1 Fire Detection

As a minimum, the fire detection instrumentation for each fire detection zone shown in Table 9A.3-18 shall be operable whenever safety-related equipment protected by the fire detection instrument is required to be operable.

Action

1. With any, but not more than one-half the total in any, fire zone, Function N*, fire detection instruments shown in Table 9A.3-18 inoperable, restore the inoperable Function N* instrument(s) to operable status within 14 days, or within 1 hr establish a fire watch patrol to inspect the zone(s) with the inoperable instrument(s) at least once per hour, or implement a preplanned provision(s) in accordance with the assessment of a qualified Fire Protection Engineer.
2. With more than one-half the Function N* fire detection instruments in any fire zone shown in Table 9A.3-18 inoperable, or with any Functions S* and X* instruments shown in Table 9A.3-18 inoperable, or with any two or more adjacent instruments shown in Table 9A.3-18 inoperable, within 1 hr establish a fire watch patrol to inspect the zone(s) with the inoperable instrument(s) at least once per hour, or implement a preplanned provision(s) in accordance with the assessment of a qualified Fire Protection Engineer.

Exception: For Fire Zone 281NZ, up to three ionization detectors may be inoperable.

Surveillance Requirements

* These letters are found in the alphanumeric fire zone designation and are explained in the footnote of Table 9A.3-18.

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The above-required fire detection instruments (except those installed in fire zones 353SG, 354SG, 357XG, 358XG, 362SG, 374SG, 375SG, 376XG and 381SG) shall be demonstrated operable at least annually in accordance with the following test methodology.

At least 10 percent of the installed detectors, and a minimum of one detector in each detection loop, will be tested by initiating an alarm at the detector in its installed location (channel functional test). Should a detector fail to alarm under the simulated fire condition, it will be corrected per procedure, and an additional 20 percent, minimum of two detectors in the affected loop will be tested. Should a failure to alarm occur in this expanded sample population, the failure will be corrected per procedure, and all remaining detectors in the affected loop will be tested and corrected as necessary. This testing scheme will be cycled through all detectors in a detection loop until all detectors in the loop have been tested. The cycle will then be repeated. Where the above outlined testing cannot be accomplished within the required time frame due to accessibility or safety concerns during plant operation, the testing shall be performed during each refuel outage as follows:

At least 20 percent of the installed detectors, and a minimum of one detector in each detection loop, will be tested by initiating an alarm at the detector in its installed location (channel functional test). Should a detector fail to alarm under the simulated fire condition, it will be corrected per procedure, and an additional 20 percent, minimum of two detectors in the affected loop will be tested. Should a failure to alarm occur in this expanded sample population, the failure will be corrected per procedure, and all remaining detectors in the affected loop will be tested and corrected as necessary. This testing scheme will be cycled through all detectors in a detection loop until all detectors in the loop have been tested.

The above-required fire detection instruments installed in fire zones 353SG, 354SG, 357XG, 358XG, 362SG, 374SG, 375SG, 376XG and 381SG shall be demonstrated operable at least once every 5 yr in accordance with the following test methodology.

At least 50 percent of the installed detectors, and a minimum of one detector in each detection loop, will be tested by initiating an alarm at the detector in its installed location (channel functional test). Should a detector fail to alarm under the simulated fire condition, it will be corrected per procedure, and all remaining detectors in the affected loop will be tested.

The supervised circuits associated with the detector alarms of each of the above-required fire detection instruments are continuously monitored by their associated fire alarm panel.

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The nonsupervised circuits associated with detector alarms between the instruments and the control room shall be demonstrated operable at least once per 31 days.

9A.3.6.1.1 Fire Detection for Safety-Related Equipment

Class A, supervised fire detection is provided for areas that contain or present a fire exposure to safety-related equipment. Areas containing negligible fire exposure from cable loading and/or transient combustibles, as determined by the Unit 2 Fire Protection Engineer, do not require Class A supervised fire detection. Class B supervision is provided for actuation portions of the suppression system circuits.

9A.3.6.1.2 Fire Detection (NFPA-72D and NFPA-72E)

The fire detection and signaling systems comply with the requirements of NFPA-72D and NFPA-72E, except that position switches for steel-bodied valves indicate the off-normal position when the stem of the valve has moved 2/5 the distance from the normal position. Location and placement of detectors is in accordance with the guidelines of NFPA-72E, except where special conditions do not permit. In those cases, detectors are located using criteria developed by qualified Fire Protection Engineers, based on engineering judgment, as permitted by NFPA-72E. Refer to Table 1.9-1, Note 57 (Difference 9), and Table 9.5-3 for interpretation and specific deviations from NFPA-72D and NFPA-72E.

9A.3.6.1.3 Testing of Detectors

Preoperational and periodic testing of detectors will not affect the actuation of protective relays in other plant systems. Unit 2 does not use pulsed-line type detectors.

9A.3.6.1.4 Audible and Visual Alarms

Fire detection systems give audible and visual annunciation in the control room and local audible alarms, and annunciate at the local panels.

9A.3.6.1.5 Unique Alarms

Fire alarms are distinctive and unique from other plant system alarms.

9A.3.6.1.6 Power Supplies for the Fire Detection System

The Unit 2 fire detection system is fed through the two stub buses through an automatic transfer switch. The primary source which feeds the two stub buses is the unit generator, and the secondary sources include either of the two offsite power sources, or the diesel generators. In case of the loss of the

primary source, the transfer switch automatically connects the system to the secondary source. This arrangement satisfies the intent of the requirements of NFPA-72D, Section 2220. For further details on the Unit 2 electrical system, refer to Section 8.3.

9A.3.6.1.7 Design Bases for Fire Detection Instrumentation

Operability of the detection instrumentation addressed in Section 9A.3.6.1 ensures that adequate warning capability is available for prompt detection of fires and that fire suppression systems that are actuated by fire detectors will discharge extinguishing agent in a timely manner. Prompt detection and suppression of fires will reduce the potential for damage to safety-related equipment and is an integral element in the overall facility fire protection program.

Fire detectors that are used to actuate fire suppression systems represent a more critically important component of a plant's fire protection program than detectors that are installed solely for early fire warning and notification. Consequently, the minimum number of operable fire detectors must be greater.

The loss of detection capability for fire suppression systems, actuated by fire detectors, represents a significant degradation of fire protection for any area. As a result, the establishment of a fire watch patrol must be initiated at an earlier stage than would be warranted for the loss of detectors that provide only early fire warning. The establishment of frequent fire patrols in the affected areas is required to provide detection capability until the inoperable instrumentation is restored to operability.

9A.3.6.2 Fire Protection Water Supply System

The requirements can be found in Sections 9A.3.6.2.6 and 9A.3.6.2.7.

9A.3.6.2.1 Yard Fire Main Loop

An underground yard fire main loop is designed to meet the anticipated water requirements. The installation of the fire main loop meets the requirements of NFPA-24, Standard for Outside Protection, with the following exceptions:

1. In some locations, due to ductlines, drainage ditches, and railroad embankments, the depth of cover provided does not meet the 5 1/2 ft requirement. (NFPA-24 requires that the top of the pipe be buried not less than 1 ft below the frostline of the locality, which is 4 1/2 ft for Unit 2). However, in all locations, the depth of cover does exceed 4 1/2 ft and is, therefore, considered adequate.

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2. Approximately 500 ft of the fire protection yard main (north/south run along the west side of the yard loop) have nonasphalt-coated flange bolt assemblies. An analysis has determined that the assemblies will not be significantly affected over the lifetime of the facility. However, all bolted joint assemblies of the fire mains to be buried will be coated with a corrosion-retarding material.
3. The operating valve and drain of fire hydrant 2FPW-FHY10 are installed below the water table and its drain holes are not plugged (NFPA-24 requires hydrants installed below the water table to have their drain holes plugged). Because the drain holes are open, standing water may be present in the barrel of this hydrant up to the groundwater level (el 255 ft 0 in). However, the groundwater level of the site is below the maximum frost depth and freezing of the water in the barrel will not occur; therefore, its operability is not impaired and the installation is considered adequate.

Figure 9A.3-1 shows fire mains, valves, location of hydrants, and fire pump connections.

9A.3.6.2.2 Sectional Control Valves

Approved postindicator sectional control valves or key-operated valves with valve boxes are provided to isolate portions of the fire main loop for maintenance or repair purposes.

9A.3.6.2.3 Hydrant Isolation Valves

Curb box valves are provided to isolate each hydrant from the fire main for maintenance purposes.

9A.3.6.2.4 Fire Main System Piping

The fire main system piping is separate from service water and sanitary water system piping.

9A.3.6.2.5 Multiunit Nuclear Power Plant Sites

Unit 1 and Unit 2 are located adjacent to each other. Each unit has an independent fire main loop with its own water supply and are interconnected.

9A.3.6.2.6 Fire Pumps

The fire suppression water system shall be operable with:

1. Two operable fire suppression pumps, each with a capacity of 2500 gpm, with their discharge aligned to the fire suppression header, and

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2. An operable flow path capable of taking suction from the service water bay and transferring the water through distribution piping with operable sectionalizing control or isolation valves to the yard hydrant curb valves, the last valve ahead of the water flow alarm device on each sprinkler or hose standpipe, and the last valve ahead of the deluge valve on each deluge or spray system required to be operable in accordance with Sections 9A.3.6.3.3, 9A.3.6.3.4, and 9A.3.6.2.7 at all times.

Action

1. With one pump inoperable, restore the inoperable equipment to operable status within 7 days or provide an alternate backup pump or supply.
2. With the fire suppression water system otherwise inoperable, establish a backup fire suppression water system within 24 hr.

Surveillance Requirements

The fire suppression water system shall be demonstrated operable:

1. At least once per 31 days by starting the electric motor-driven fire pump and operating it for at least 15 min on recirculation flow.
2. At least once per 12 months by verifying that each valve (manual, power operated, or automatic) in the flow path is in its correct position.
3. At least once per 12 months by performance of a system flush.
4. At least once per 12 months by cycling each testable valve in the flow path through at least one complete cycle of full travel.
5. At least once per 18 months by performing a system functional test which includes simulated automatic actuation of the system throughout its operating sequence, and:
 - a. Verifying that each automatic valve in the flow path actuates to its correct position,
 - b. Verifying that each fire suppression pump develops at least 2500 gpm at a net discharge head of 113 psig,

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- c. Cycling each valve in the flow path that is not testable during plant operation through at least one complete cycle of full travel, and
 - d. Verifying that each fire suppression pump starts and maintains the fire suppression water system pressure greater than or equal to 125 psig.
6. At least once per 5 yr by performing a flow test of the system in accordance with the NFPA Fire Protection Handbook.

The diesel-driven fire suppression pump shall be demonstrated operable:

- 1. At least once per 31 days by:
 - a. Verifying the fuel day tank contains at least 350 gal of fuel.
 - b. Starting the diesel-driven pump from ambient conditions and operating for greater than or equal to 30 min on recirculation flow.
- 2. At least once per 92 days by verifying that a sample of diesel fuel from the fuel storage tank, obtained in accordance with ASTM D4057-81, is within the acceptable limits specified in Table 1 of ASTM D975-81 when checked for viscosity, water, and sediment.
- 3. At least once per 18 months by subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for the class of service.

The diesel-driven fire pump starting 24-V battery bank and charger shall be demonstrated operable:

- 1. At least once per 7 days by verifying that:
 - a. The electrolyte level of each cell is above the plates.
 - b. The pilot cell specific gravity, corrected to 77°F and full electrolyte level, is 1.235 or more.
 - c. The overall battery voltage is greater than or equal to 25.5 V with the battery on float charge. An overall battery voltage of 25.5 or more volts represents 12 pilot cells each carrying at least a 2.13-V charge.
- 2. At least once per 92 days by verifying that all cell parameters for all battery cells are demonstrated

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operable per item 1 above, and the difference between the pilot cell with the highest specific gravity when compared to the pilot cell with the lowest specific gravity is 0.040 or less.

3. At least once per 18 months by verifying that:
 - a. The batteries, cell plates, and battery racks show no visual indication of physical damage or abnormal deterioration, and
 - b. Battery and terminal connections are clean, tight, and free of corrosion.

Unit 2 has two fire pumps, one electric motor driven and one diesel engine driven, each rated at 2,500 gpm at net discharge pressure of 125 psig and each capable of meeting maximum fire demand flow. The two pumps are headered together and connected to the yard fire main loop in four places. Two connections are adjacent to each other, the third runs through the turbine building, and the fourth runs through the control building and connects to the yard loop at points remote from the first two connections. The pumps are located in separate rooms with 3-hr ratings.

The fire pump installation conforms to NFPA-20, Standard for the Installation of Centrifugal Fire Pumps, except that the electric motor-driven pump uses a non-UL listed 4.16-kV circuit breaker modified to meet the intent of NFPA-20 instead of a UL-listed controller. Because there are no UL-listed fire pump controllers (rated in excess of 600 V), Underwriters' Laboratories conducted a field investigation of the 4.16-kV controller and identified the following deviations from NFPA-20:

1. "Fire Pump Controller" nameplate not provided on the controller.
2. "Circuit Breaker Disconnecting Means" nameplate not provided on the circuit breaker enclosure.
3. No visual marking provided to indicate overcurrent protection device setting.
4. Remote switch provided for stopping the motor.

The following resolutions have been implemented:

1. Nameplate provided.
2. Nameplate provided.
3. Circuit breaker setting verified and visual marking thereof provided.

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4. Remote "stop" switch removed.

The 4.16-kV controller now meets the requirements of NFPA-20.

9A.3.6.2.7 Outside Hose Installation

The yard fire hydrants and associated equipment shown in Table 9A.3-19 shall be operable whenever safety-related equipment in the areas protected by the yard fire hydrants is required to be operable.

Action

With one or more of the yard fire hydrants shown in Table 9A.3-19 inoperable, within 1 hr have sufficient additional lengths of 2 1/2-in diameter hose located at an adjacent operable hydrant to provide service to the unprotected area(s) if the inoperable fire hydrant is the primary means of fire suppression; otherwise, provide the additional hose within 24 hr.

Surveillance Requirements

Each of the yard fire hydrants and associated equipment shown in Table 9A.3-19 shall be demonstrated operable:

1. At least once per 12 months by visual inspection of the associated fire hydrant equipment to assure equipment is available at the Operations Building (west end).
2. At least once per 12 months, during September, October, or November, by visually inspecting each yard fire hydrant and verifying that the hydrant barrel is dry and that the hydrant is not damaged. (Hydrant 2FPW-FHY10 shall be verified dry down to a point at least 5 ft below ground level.)
3. At least once per 12 months by:
 - a. Conducting a hose hydrostatic test at a pressure of 150 psig or at least 50 psig above the maximum fire main operating pressure, whichever is greater. (Extend to 36-month interval if hose is stored inside a building.)
 - b. Replacement of all degraded gaskets in couplings. (Extend to 36-month interval if hose is stored inside a building.)
 - c. Performing a flow check of each hydrant.

Unit 2 complies with the intent of this SRP guideline. The average distance between hydrants is less than 250 ft, and between hose houses less than 1,000 ft. Hydrants and hose coupling threads are compatible or adapters are provided for

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local fire departments. In addition, appropriate equipment is available to establish an effective hose stream.

9A.3.6.2.8 Reliable Water Supplies

The source of water supply to the fire pumps is Lake Ontario. Each pump takes suction from the seismically designed service water intake tunnel. Unit 1 fire pumps (rated at 2,500 gpm at net discharge pressure of 125 psig) also take suction from Lake Ontario through a separate and remote intake tunnel. The fire main loops for Unit 1 and Unit 2 are interconnected in two places with normally closed valves, one remotely operable from the Unit 1 control room.

9A.3.6.2.9 Fire Water Supply

The fire water supply (Lake Ontario) is a fresh water supply and is essentially unlimited. The flow rate with one pump out of service is a nominal 2,500 gpm at net discharge pressure of 125 psig; this is ample for the largest deluge system plus 500 gpm for manual hose stream. The largest design demand would result from the simultaneous operation of the two largest deluge systems (water/foam systems F-1 and F-2) and the turbine generator bearing water spray system (W-25), which are located in the turbine building. The design demand for water/foam system F-1 (zone 734SF) is 1,048 gpm, for water/foam system F-2 (zone 735SF) is 655 gpm, and for turbine generator bearing water spray system W-25 is 590 gpm. All design demand pressures are below 100 psi at el 261 ft 0 in. The total flow rate, including 500 gpm for hose streams, is 2,800 gpm. This demand can be met with either fire pump out of service. This exceeds the demand in any safety-related area.

9A.3.6.2.10 Lakes of Freshwater Ponds

See Section 9A.3.6.2.8 concerning two intakes. The intake tunnel from Lake Ontario also feeds the service water (SWP) system. Sufficient water is available for both systems, and a failure of the fire protection system does not affect the SWP system.

9A.3.6.3 Water Sprinkler and Hose Standpipe Systems

9A.3.6.3.1 Automatic Sprinkler System

Sprinkler systems and manual hose station standpipes are connected to the underground yard main and arranged so that a single failure will not impair both the automatic fire protection system and the hose reels that provide backup protection. Fire mains are provided in the turbine building, control building, and reactor building, which are fed from the yard main at both ends. This is considered to be an extension of the yard main. Automatic sprinkler flow alarms are provided.

9A.3.6.3.2 Valve Supervision

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Fire protection water supply system valves up to sprinkler system control valves and hydrant isolation valves are supervised in their required positions through the use of one or more of the following methods:

- Electrical supervision
- Periodic position verification
- Lock and chain
- Tamper seals
- Position controls

Table 9A.3-15 lists all valves supervised to ensure sprinkler and water spray systems, hose reels, and hydrants that protect safety-related equipment are operable.

NFPA-26 has been used as guidance in this area.

9A.3.6.3.3 Sprinkler and Water Spray Systems (NFPA-13 and NFPA-15)

The following spray and sprinkler systems shall be operable whenever safety-related equipment protected by the spray and/or sprinkler systems is required to be operable:

a. Spray and Sprinkler Systems

	<u>System No.</u>	<u>Building/Elevation</u>	<u>Zone No.</u>
1.	W-9	115-kV Transformer/261'-0"	510SW
2.	W-16	115-kV Transformer/261'-0"	506SW
3.	W-33	Electrical Tunnel - 35°	302NW
4.	W-34	Electrical Tunnel - 140°	301NW
5.	W-35	Electrical Tunnel - 230°	304NW
6.	W-36	Electrical Tunnel - 315°	303NW
7.	W-42	Control Bldg. - El 288'-6"	360NZ
8.	W-43	Control Bldg. - El 306'-0"	378NZ
9.	W-44	Control Bldg. - El 214'-0" to 306'-0"	309NW, 324NW, 337NW, 359NW, 377NW
10.	W-45	Control Bldg. - El 214'-0" to 237'-0"	323NW, 326NW, 327NW
11.	W-46	Control Bldg. - El 214'-0" to 306'-0"	305NW, 321NW, 332NW, 352NW, 371NW
12.	W-47	Control Bldg. - El 214'-0" to 237'-0"	322NW, 325NW, 331NW
13.	W-55	Reactor Bldg. - El 175'-0"	204SW
14.	W-57	Standby Gas - El 261'-0" Treatment Bldg. & 286'-0"	242NW, 251NW
15.	W-60	Diesel Fire Pump Rm - El 261'-0"	804NW

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b. Preaction Systems

	<u>System No.</u>	<u>Building/Elevation</u>	<u>Zone No.</u>
1.	W-48	Diesel Generator Bldg. - El 261'-0"	402SW
2.	W-49	Diesel Generator Bldg. - El 261'-0"	404SW
3.	W-50	Diesel Generator Bldg. - El 261'-0"	403SW
4.	W-54	Reactor Bldg. and Auxiliary Bay - South El 175'-0" to 328'-10"	206SW, 207SW, 208SW, 213SW, 214SW, 223SW, 224SW, 238SW, 239SW, 245SW, 255SW, 262SW, 272SW, 274SW
5.	W-56	Reactor Bldg. and Auxiliary Bay - North El 175'-0" to 328'-10"	201SW, 202SW, 203SW, 211SW, 212SW, 222SW, 232SW, 243SW, 252SW, 261SW, 271SW, 273SW, 221SW, 231SW

Action

With one or more of the above-required spray and/or sprinkler systems inoperable, within 1 hr implement one of the following actions:

1. Verify the operability of fire detectors within the area protected by the system and establish a daily inspection of the area to verify no increase in fire hazards, or
2. Trip the system wet (for preaction systems if inoperability is due to automatic system actuation circuit failure), or
3. Establish an hourly fire watch patrol, or
4. Implement a preplanned provision(s) in accordance with the assessment of a qualified Fire Protection Engineer.

Surveillance Requirements

Each of the above-required spray and sprinkler systems shall be demonstrated operable:

1. At least once per 12 months by verifying that each valve (manual, power operated, or automatic) in the flow path is in its correct position.

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2. At least once per 12 months by cycling each testable valve in the flow path through at least one complete cycle of full travel.
3. At least once per 18 months:
 - a. By performing a system functional test which includes simulated automatic actuation of the system, and:
 - (1) Verifying that the automatic valves in the flow path actuate to their correct positions on a test signal, and
 - (2) Cycling each valve in the flow path that is not testable during plant operation through at least one complete cycle of full travel.
 - b. By a visual inspection of the spray and sprinkler headers to verify their integrity, and
 - c. By a visual inspection of each deluge nozzle's spray area to verify that the spray pattern is not obstructed.
4. At least once per 3 yr by performing an air or water flow test through each open head spray and sprinkler header, with the exception of the 115-kV transformer systems, and verifying each open head spray and sprinkler nozzle is unobstructed.
5. At least once per 5 yr by performing a water flow test of the water spray systems protecting the 115-kV transformers. This test shall be conducted during scheduled transformer outages.

Except for the items listed in Table 9.5-3, sprinkler and water spray systems for Unit 2 are in compliance with the applicable sections of NFPA-13 and NFPA-15.

9A.3.6.3.4 Manual Hose Installation (NFPA-14)

The fire hose stations shown in Table 9A.3-20 shall be operable whenever safety-related equipment in the areas protected by the fire hose stations is required to be operable.

Action

With one or more of the fire hose stations shown in Table 9A.3-20 inoperable, provide gated wye(s) on the nearest operable hose station(s). One outlet of the wye shall be connected to the standard length of hose provided for the hose station. The second outlet of the wye shall be connected to a length of hose

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sufficient to provide coverage for the area left unprotected by the inoperable hose station. Where it can be demonstrated that the physical routing of the fire hose would result in a recognizable hazard to operating technicians, plant equipment, or the hose itself, the fire hose shall be stored in a roll at the outlet of the operable hose station. Signs shall be mounted above the gated wye(s) to identify the proper hose to use. The above action shall be accomplished within 1 hr, if the operable fire hose is the primary means of fire suppression; otherwise, route the additional hose within 24 hr.

Surveillance Requirements

Each of the fire hose stations shown in Table 9A.3-20 shall be demonstrated operable:

1. At least once per 12 months by a visual inspection of the fire hose stations accessible during plant operation to assure all required equipment is at the station.
2. At least once per 18 months by:
 - a. Removing the hose for inspection and re-racking for fire hose stations that are accessible during plant operation, and
 - b. Inspecting all gaskets and replacing any degraded gaskets in the couplings for fire hose stations that are accessible during plant operation.
3. At least once per operating cycle, plus a maximum of 25 percent of one operating cycle by:
 - a. Visual inspection of the fire hose stations not accessible during plant operation to assure all required equipment is at the station.
 - b. Removing the hose for inspection and re-racking for fire hose stations that are not accessible during plant operation, and
 - c. Inspecting all gaskets and replacing any degraded gaskets in the couplings for fire hose stations that are inaccessible during plant operation.
4. At least once per 3 yr by:
 - a. Partially opening each hose station valve to verify valve operability and no flow blockage.
 - b. Conducting a hose hydrostatic test at a pressure of 150 psig or at least 50 psig above the maximum

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fire main operating pressure, whichever is greater.

Except for the items listed in Table 9.5-3, manual hose systems are in compliance with the applicable sections of NFPA-14 and are able to reach any location that contains, or could present, a fire exposure hazard to safety-related equipment with at least one effective hose stream. The 1 1/2-in lined hoses and appropriate nozzles are provided at each location (see Section 9.5.1.2.4). The Unit 2 standpipe is not seismically qualified, as discussed in Section 9A.3.1.3.3.

9A.3.6.3.5 Hose Nozzles

Hose nozzles at Unit 2 are suitable for the type of hazards listed in the FHA for each area. Nozzles are equipped with shutoff handles and are adjustable fog, which can be varied down to a 10-deg minimum spray pattern, allowing safe use on energized electrical equipment.

9A.3.6.3.6 Fire Hose Testing

See Section 9A.3.6.3.4.

9A.3.6.3.7 Foam Suppression (NFPA-16)

Unit 2 has installed fixed systems using 3-percent low expansion, protein-base foam for areas below the turbine operating floor where oil could flow in the event of a broken lube oil pipe. Foam water sprinkler system design complies with the requirements of NFPA-16. Hose stations around the turbine-generator unit also are provided with piped foam concentrate to support manual firefighting in this area.

9A.3.6.4 Halon 1301 Suppression Systems (NFPA-12A)

The following Halon systems shall be operable with the storage tanks having at least 95 percent of full charge weight or level, and 90 percent of full charge pressure whenever equipment protected by the Halon systems is required to be operable.

	<u>Zone No.</u>	<u>Building/Elevation</u>
a.	353SG	Control Bldg. - El 288'-6"
b.	354SG	Control Bldg. - El 288'-6"
c.	362SG	Control Bldg. - El 288'-6"
d.	357XG	Control Bldg. - El 288'-6"
e.	358XG	Control Bldg. - El 288'-6"
f.	374SG	Control Bldg. - El 306'-0"
g.	375SG	Control Bldg. - El 306'-0"
h.	376XG	Control Bldg. - El 306'-0"
i.	381SG	Control Bldg. - El 306'-0"

Action

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With one or more of the above-required Halon systems inoperable, within 1 hr implement one of the following actions:

1. Verify the operability of fire detectors within the area protected by the system and establish a daily inspection of the area to verify no increase in fire hazards, or
2. Establish an hourly fire watch patrol, or
2. Implement a preplanned provision(s) in accordance with the assessment of a qualified Fire Protection Engineer.

Surveillance Requirements

Each of the above-required Halon systems shall be demonstrated operable:

1. At least once per 12 months by verifying that each valve (manual, power operated or automatic) in the flow path is in its correct position.
2. At least once per 6 months by verifying Halon storage tank weight or level* and pressure.
3. At least once per 60 months by verifying the system, including associated ventilation system fire dampers and fire door release mechanisms, actuates manually and automatically upon receipt of a simulated actuation signal. In the event that there is a failure of any Halon system(s) to actuate during the surveillance (following repair and post-maintenance testing), the Halon system(s) that experienced a failure shall be subjected to surveillance within 18 months. Following testing of a Halon system without a failure, the system shall be demonstrated operable at least once per 60 months as described above.

Fixed Halon 1301 suppression systems have been installed in the PGCC floor modules in the control and relay rooms, radwaste control room, relay room, and computer room. Halon systems comply with the applicable sections of NFPA-12A, 1980 Edition, and the requirements of BTP CMEB 9.5-1 Section C.6.d. Disarming of Halon suppression systems complies with the requirements of BTP CMEB 9.5-1 Section C.2.j. The Unit 2 PGCC Halon suppression system is in accordance with GE NEDO-10466-A, Revision 2, dated February 1979, with the following deviations:

1. Section 3.3.2.6

* Level determination for the purpose of verifying Halon system operability shall conform to NRC-accepted UL or FM test procedures and/or equipment.

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- a. Fire stops will consist of silicone foam and kaowool damming.
- b. Fire stops are located in all divisional transition openings and in all openings through Halon/detection zone boundaries.

2. Sections 4.2.6.10 and 5.2.3

Halon 1301 system design and flow rate calculations are based on achieving 6-percent concentration in 10 sec and maintaining it for 10 min.

9A.3.6.5 CO₂ Suppression Systems (NFPA-12)

The following low-pressure CO₂ systems shall be operable whenever equipment protected by the CO₂ systems is required to be operable.

<u>Zone Number</u>	<u>Building/Elevation</u>
336XL	Control Building/El 261'-0"
333XL	Control Building/El 261'-0"
342XL	Control Building/El 261'-0"
253XL	Reactor Building/El 289'-0"

Action

With one or more of the above-required CO₂ systems inoperable, within 1 hr implement one of the following actions:

1. Verify the operability of fire detectors within the area protected by the system and establish a daily inspection of the area to verify no increase in fire hazards, or
2. Establish an hourly fire watch patrol, or
3. Implement a preplanned provision(s) in accordance with the assessment of a qualified Fire Protection Engineer.

Surveillance Requirements

Each of the above-required CO₂ systems shall be demonstrated operable at least once per 12 months by verifying that each valve (manual or power operated) in the flow path is in its correct position.

Each of the above-required low-pressure CO₂ systems shall be demonstrated operable:

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1. At least once per 7 days by verifying the CO₂ storage tank 2FPL-TK1 contains 4 tons of CO₂ at a pressure to be greater than 275 psig, and
2. At least once per 18 months by verifying:
 - a. The system, including associated ventilation system fire dampers, actuate manually and automatically upon receipt of a simulated actuation signal.

CO₂ systems are used for protection of switchgear rooms, the alternator exciter enclosure, turbine bearings, and the lube oil reservoir. CO₂ systems comply with applicable sections of NFPA-12 and the requirements of BTP CMEB 9.5-1 Section C.6.e. However, the automatically-actuated CO₂ systems have been placed in alarm-only mode due to life safety concerns until modifications to improve personnel safety are completed.

Disarming of CO₂ suppression systems will comply with the requirements of BTP CMEB 9.5-1 Section C.2.j.

9A.3.6.6 Portable Extinguishers

Unit 2 portable extinguishers are in compliance with the requirements of applicable sections of NFPA-10 except as noted in Table 9.5-3. Adverse effects of portable extinguishing agents have been considered in the placement of extinguishers. Portable fire extinguishers applicable to the hazard and the guidelines of NFPA-10 have been provided in all areas of the plant. An inspection and maintenance program has been developed for this equipment.

9A.3.6.7 Design Bases for Fire Suppression Systems

The operability of the fire suppression systems ensures that adequate fire suppression capability is available to confine and extinguish fires occurring in any portion of the facility where safety-related equipment is located. The fire suppression system consists of the water system, spray and/or sprinkler systems, CO₂ systems, Halon systems, and fire hose stations. The collective capability of the fire suppression systems is adequate to minimize potential damage to safety-related equipment and is a major element in the facility fire protection program.

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

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The surveillance requirements provide assurances that the minimum operability requirements of the fire suppression systems are met. An allowance is made for ensuring a sufficient volume of Halon in the Halon storage tanks by verifying the weight or level and pressure of the tanks. Level measurements are made by either a UL- or FM-approved method.

In the event the fire suppression water system becomes inoperable, immediate corrective measures must be taken because this system provides the major fire suppression capability of the plant.

9A.3.7 Guidelines for Specific Plant Areas

9A.3.7.1 Primary Containment and Reactor Building

9A.3.7.1.1 Normal Operation

General area coverage smoke detectors have been provided in the reactor building to alarm and annunciate in the control room and to alarm locally. The primary fire hazard in the reactor building is cable insulation/jacketing, primarily located in cable trays. Automatic sprinkler systems are provided for single cable tray stacks containing five trays or more (vertically) and for multiple tray stacks containing more than three trays. MCCs in areas where water spray protection is provided are NEMA Type 3 (raintight).

9A.3.7.1.1.1 Operation of Fire Protection Systems

The operation of fire protection systems will not compromise safety-related equipment due to the separation, barriers, and protection provided for redundant trains of safety-related equipment.

9A.3.7.1.1.2 Primary Containment Fire Protection

The Unit 2 containment is inerted during normal operation; therefore, this requirement does not apply.

9A.3.7.1.1.3 Primary Containment Fire Detection

The Unit 2 containment is inerted during normal operation. General area smoke detectors are provided in the primary containment during refueling and major maintenance periods only.

9A.3.7.1.1.4 Primary Containment Standpipe and Hose Stations

Continuous flow hose reels with 1-in hose reels with spray nozzles are provided in the primary containment for use during refueling and major maintenance.

9A.3.7.1.1.5 Oil Collection System for Recirculation Pumps

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Refer to Section 9A.3.7.1.1.2.

9A.3.7.1.1.6 Reactor Building Fire Protection

Fire detection and suppression is provided for fire hazards in the reactor building as identified by the FHA. Refer to Section 9A.3.6 for details.

9A.3.7.1.2 Refueling and Maintenance

The primary containment general area coverage detection system mentioned previously will be in operation during refueling and major maintenance. Portable fire extinguishers will be strategically located within the primary containment when the containment is open. Hose reel standpipes have been installed throughout the remainder of the reactor building.

9A.3.7.1.3 Breathing Apparatus

One set of fire equipment storage lockers will be located in the Turbine Building electrical bay/personnel access elev 261 for containment entry. These lockers will have a minimum of 5 self-contained breathing units and at least 10 spare bottles.

9A.3.7.2 Control Room Complex

The Unit 2 control and relay rooms are separated from each other and from other areas by 3-hr rated barriers. Approved penetration seals, fire dampers, and doors are provided for openings through the control room and relay room barriers.

Unit 2 utilizes a PGCC in which wiring is routed through a system of prefabricated floor modules. A fixed automatic Halon suppression system is installed in all floor modules as described in Section 9A.3.6.4.

The floor modules are protected by heat and smoke detectors located in each floor module. Fires above the floor are detected either by the general area smoke detection system or by smoke detectors located within termination cabinets, panels, or groups of panels with a common internal open area. Fire suppression for above-the-floor fires utilizes portable extinguishers and manual CO₂ and water hose reels located immediately outside the control and relay rooms.

Breathing Apparatus

Breathing apparatus for control room personnel will be provided the same as Unit 1. This apparatus is independent of that required for firefighting and damage control.

Smoke detection capability is provided in the outside air intakes for the control room and relay room ventilation system. A manually actuated smoke removal system is provided, which is

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common to the main control room and relay room elevations. Further details for the smoke removal systems are provided in Section 9.4.1. Carpeting is provided in the control room. Further details are provided in Section 9A.3.5.1.

9A.3.7.3 Cable Spreading Room

Unit 2 does not have a conventional cable spreading room, but uses the PGCC design (Section 9A.3.7.2).

9A.3.7.4 Plant Computer Room

The plant computer is not safety related; it is not required to shut down the reactor or limit the release of radioactivity to the environment. The computer room is located within the control room pressure boundary on the relay room elevation. The north and west computer room boundary walls are not fire rated. The relay room elevation of the control room pressure boundary is separated from all other areas by 3-hr barriers. A smoke detection system that alarms in the control room and an automatic total-flooding Halon suppression system have been provided in the computer room. Manual CO₂ and water hose reels and portable extinguishers are available for backup.

9A.3.7.5 Switchgear Rooms

Switchgear rooms throughout the plant are protected with total-flooding CO₂ extinguishing systems. Manual CO₂ and water hose reels and portable extinguishers are available for backup protection. Detection systems annunciate in the control room and alarm locally. Three-hr walls separate switchgear rooms from each other and from the remainder of the plant except for the 600-V switchgear room which is separated by 1 1/2-hr barrier. Manually-actuated smoke removal capability is provided for normal switchgear building and the control building switchgear rooms. For further details, refer to Section 9.4. Smoke removal capability would be provided through the use of portable fans if required for other switchgear rooms.

9A.3.7.6 Remote Safety-Related Panels

Unit 2 has two remote shutdown rooms separated from each other and other plant areas by 3-hr barriers. An automatic fire detection system annunciates in the control room and alarms locally. Manual CO₂ and water hose reels and portable extinguishers have been provided outside this room.

9A.3.7.7 Safety-Related Battery Rooms

Battery rooms are separated from each other and from the remainder of the plant by 3-hr fire walls, which are in excess of the fire load calculated in the FHA. All penetrations have a 3-hr rating.

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Separate ventilation systems have been provided for battery rooms to limit hydrogen buildup to 2 percent maximum. Fan failure is annunciated in the control room. Loss of flow initiates the redundant fan and prints out on the computer.

Early-warning smoke detection is provided in all battery rooms. Manual water hose reels and portable extinguishers are located near all battery rooms.

9A.3.7.8 Turbine Lubrication and Control Oil Storage and Use Areas

All oil hazards connected with the turbine oil systems are located in the turbine building. There is no mechanical safety-related equipment located in the turbine building. Extensive fire suppression systems have been designed for the turbine oil hazards as discussed in the FHA. Turbine oil does not pose a hazard to any safety-related system.

9A.3.7.9 Diesel Generator Areas

Diesel generators are separated from each other and from other areas of the plant by 3-hr walls. Automatic preaction sprinkler systems have been provided for all three diesels. Division I, II, and III diesel generators have been modified to allow spraying water on them without harmful effects.

All three diesel generator rooms have smoke detection systems that alarm in the control room and manual CO₂ and water hose reels and portable extinguishers for backup. Drainage is provided for firefighting water. Day tanks contain less than 1,100 gal and are located in separate rooms within the associated diesel generator room. Curbs are provided to contain the entire contents of the tank in the event of a tank leak and postulated sprinkler discharge. Automatic sprinkler protection and a smoke detection system have been provided.

The combustion air for each diesel generator comes through a separate air intake which is located at the south end of the diesel generator building. The exhaust air outlets for the diesel generator building ventilation systems are located on the roof at the north end of the diesel generator building, approximately 80 ft away.

Each diesel generator room is provided with 3-hr rated fire dampers in the ventilation systems. If a fire occurs in a diesel generator room it would be isolated from the other diesel generator rooms by the fire dampers and 3-hr fire walls. This would prevent a fire in one diesel generator from effecting the other diesel generators.

No credible fire and single failure of the fire protection system in the diesel generator building can degrade or destroy more than one combustion air intake.

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9A.3.7.10 Diesel Fuel Oil Storage Tanks

Diesel fuel oil storage tanks are buried. They are approximately 60 ft long and 12 ft in diameter. Half of each tank extends under the diesel generator building. The other half is buried under the access driveway. This installation complies with the requirements of NFPA-30.

9A.3.7.11 Safety-Related Pumps

All safety-related pumps are separated from each other and from the remainder of the plant by 3-hr fire walls (the RCIC pump room has non-UL rated relief panels). The RHR and HPCS pump rooms do not have automatic sprinkler protection for the general area, because the FHA demonstrates that this is not required. However, other than the pumps and motors themselves, the only other combustible materials in the RHR pump rooms are the cable trays, which have automatic sprinkler systems. Early-warning detection systems, which alarm locally and in the control room, and manual water hose reels and portable extinguishers have been provided. The RCIC pump room has a deluge system which is automatically actuated by thermal detectors. Floor drains are included in these areas. The ventilation system in the reactor building is a 100-percent outside air supply and exhaust system that will remove smoke in the event of a fire.

9A.3.7.12 New Fuel Area

Smoke detection, water hose reels, and portable extinguishers are provided throughout the reactor building, which includes the new fuel area. The detection system annunciates in the control room and alarms locally. The new fuel storage area has a drainage system to preclude the accumulation of water; however, the storage configuration is such that criticality would not occur if water accumulated.

9A.3.7.13 Spent Fuel Pool Area

Smoke detection, water hose reels, and portable extinguishers are provided throughout the reactor building, which includes the spent fuel pool area. The detection system annunciates in the control room and alarms locally.

9A.3.7.14 Radwaste Building and Decontamination Areas

The radwaste building is separated from other areas of the plant by 3-hr fire walls. Automatic wet-pipe sprinklers are provided in the asphalt storage and process areas, liquid radwaste fiberglass storage tank areas, above certain cable tray runs in aisleways (four or more levels), and the truck loading area.

Preaction sprinklers are provided in the dry compacted waste area, and deluge protection is provided for the radwaste process

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areas. Manual water hose reels and portable extinguishers are provided. An early-warning detection system with local and control room annunciation is provided. The ventilation system for the radwaste building is a 100-percent outside air supply and exhaust system that would remove smoke in the event of a fire.

Sprinkler protection and smoke detection are provided in the decontamination area (el 261'). Where ventilation ducts penetrate the rated walls, fire dampers are provided. Manual water hose reels and portable extinguishers are available at these locations. The detection system annunciates in the control room and alarms locally.

9A.3.7.15 Safety-Related Water Tanks

Unit 2 has no outdoor safety-related tanks. There are three safety-related tanks located in the reactor building, one associated with the SLCS and two associated with the spent fuel cooling system. The reactor building has a general area smoke detection system that alarms locally and in the control room, a water hose reel system, and portable extinguishers throughout. Storage of combustibles is controlled through the plant.

9A.3.7.16 Records Storage Area

Protection and location of records storage areas are controlled administratively to minimize exposure hazards.

9A.3.7.17 Cooling Towers

The cooling tower is not safety related and is located sufficiently far from safety-related structures and is not used for the UHS.

9A.3.7.18 Miscellaneous Areas

The auxiliary boiler for Unit 2 is an electric boiler and as such will not have the hazards associated with a fuel oil system. Warehouse stores and shops are separated from Unit 2 by 3-hr rated barriers.

Smoke detection, manual water hose reels, and portable extinguishers are provided for the auxiliary boiler building.

9A.3.8 Special Protection Guidelines

9A.3.8.1 Welding and Cutting Acetylene-Oxygen Fuel Gas Systems

Protection and location of gas cylinder storage areas are controlled administratively to minimize exposure hazards. Administrative controls are discussed in Section 9A.3.2.

9A.3.8.2 Dry Ion Exchange Resins

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Dry ion exchange resins are stored in a room having 3-hr rated walls at el 328 ft 10 in of the reactor building (Figure 9A.3-8). The room has a detection system and manual water hose reels and portable extinguishers. Floor drains are provided for removal of fire protection water.

9A.3.8.3 Hazardous Chemicals

Protection and location of hazardous chemical storage areas are controlled administratively to minimize exposure hazards. Administrative controls are discussed in Section 9A.3.2.

9A.3.8.4 Materials Containing Radioactivity

Any material containing radioactivity is transferred to metal drums or containers as required and stored in appropriate centralized locations awaiting disposal. Exposure of containers to combustible materials is controlled.

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TABLE 9A.3-1

REACTOR BUILDING

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-1 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-1 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-1 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-1 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-1 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-1 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-1 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-1 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-1 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

NMP Unit 2 USAR

TABLE 9A.3-2

REACTOR BUILDING (AUXILIARY BAYS)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-2 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-2 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-2 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-2 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-2 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-2 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-2 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

NOTE: Display values rounded but nonrounded values used in calculations.

NMP Unit 2 USAR

TABLE 9A.3-3

STANDBY GAS TREATMENT BUILDING

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-3 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

NOTE: Display values rounded but nonrounded values used in calculations.

NMP Unit 2 USAR

TABLE 9A.3-4

CONTROL BUILDING

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-4 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

NMP Unit 2 USAR

TABLE 9A.3-5
ELECTRICAL TUNNELS

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-5 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

NMP Unit 2 USAR

TABLE 9A.3-6

CHILLED WATER BUILDING

Security-Related Information Figure Withheld Under 10 CFR 2.390

NMP Unit 2 USAR

TABLE 9A.3-6 (Cont'd.)

TURBINE BUILDING

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-6 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-6 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-6 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-6 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-6 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-6 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-6 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-6 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-6 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-6 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-6 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-6 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-6 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-6 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-6 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

NMP Unit 2 USAR

TABLE 9A.3-7

DIESEL GENERATOR BUILDING

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-7 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-7 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

NMP Unit 2 USAR

TABLE 9A.3-8

SCREENWELL BUILDING

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-8 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-8 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-8 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-8 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

NMP Unit 2 USAR

TABLE 9A.3-9

RADWASTE BUILDING

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-9 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-9 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-9 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-9 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-9 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-9 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-9 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-9 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-9 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-9 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

NMP Unit 2 USAR

TABLE 9A.3-10

NORMAL SWITCHGEAR BUILDING

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-10 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-10 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-10 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

NMP Unit 2 USAR

TABLE 9A.3-11

MISCELLANEOUS BUILDINGS

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-11 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-11 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

NMP Unit 2 USAR

TABLE 9A.3-12

PIPING AND STEAM TUNNELS

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-12 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

NMP Unit 2 USAR

TABLE 9A.3-13

A TYPICAL FIRE-RATED FLOOR STEEL BEAM

UL-Rated Section N717 or N718	Nine Mile Point Unit 2	Remarks/Justification
1. Restrained or unrestrained	1. Restrained	Meets the UL design.
2. Min. size of beam - W8x28 min.	2. Varies from W8x18 min. size to W36x300	Meets or exceeds the UL design in most cases.
3. 1 1/2 in. to 3 in. steel floor form units	3. 1 1/2 in to 3 in. (some 4 1/2 in.) steel floor form units.	Meets the UL design.
4. 2 1/2 in. min. 3,000 psi, 148 pcf conc. floor	4. 8 in. min. 3,000 psi, 150 pcf conc. floor	Exceeds the UL design.
5. Fireproofing material - cementitious mixture - min. avg. density 55 pcf, min. thickness 1 in.	5. Fireproofing material - cementitious mixture - min. avg. density 55 pscf, min. thickness 1 in.	Meets the UL design.

NMP Unit 2 USAR

TABLE 9A.3-14

A TYPICAL FIRE-RATED WALL ASSEMBLY

UL-Rated Section N717 or N718	Nine Mile Point Unit 2	Remarks/Justification
1. 8-in. nominal thickness hollow concrete block for 3-hr rating	1. 8-in. min. thickness poured-in-place solid reinforced concrete wall	Meets or exceeds the UL design
2. Portland cement stucco or gypsum plaster (3/4 in. thickness) adds 1/2 hr to fire rating	2. Not applicable	Not applicable
3. If hollow core spaces are filled with some approved masonry fill, add 1 hr to fire resistance rating	3. Solid homogeneously poured concrete wall is at least equivalent to filled hollow masonry wall.	Exceeds the UL design

NMP Unit 2 USAR

TABLE 9A.3-15

SUPERVISION OF FIRE PROTECTION SYSTEM VALVES

<u>FSAR Figure No.</u>	<u>Valve No.</u>	<u>Supervision</u>	
		<u>Electric</u>	<u>Administrative</u>
9.5-1a	2FPW-V2		X
	2FPW-V3		X
	2FPW-V4		X
	2FPW-V18	X	
	2FPW-V19	X	
	2FPW-V20	X	
	2FPW-V21		X
	2FPW-V22		X
	2FPW-V25		X
	2FPW-V26		X
	2FPW-V28	X	
	2FPW-V29	X	
	2FPW-V31		X
	2FPW-V35		X
	2FPW-V36		X
	2FPW-V39		X
	2FPW-V41		X
	2FPW-V48		X
	2FPW-V49		X
	2FPW-V50	X	
	2FPW-V53		X
	2FPW-V57		X
	2FPW-V355		X
	2FPW-V554	X	
	2FPW-V555	X	
9.5-1b	2FPW-V104		X
	2FPW-V105		X
	2FPW-V106		X
	2FPW-V107		X
	2FPW-V108		X
	2FPW-V109		X
	2FPW-V110		X
	2FPW-V124		X
	2FPW-V126		X
	2FPW-V127		X
	2FPW-V129		X
	2FPW-V134		X
	2FPW-V136		X
	2FPW-V138		X
	2FPW-V140		X
	2FPW-V141		X
	2FPW-V142		X
	2FPW-V143		X
	2FPW-V144		X

NMP Unit 2 USAR

TABLE 9A.3-15 (Cont'd.)

<u>FSAR Figure No.</u>	<u>Valve No.</u>	<u>Supervision</u>	
		<u>Electric</u>	<u>Administrative</u>
9.5-1b (cont'd.)	2FPW-V145		X
	2FPW-V148		X
	2FPW-V149		X
	2FPW-V150		X
	2FPW-V152		X
	2FPW-V439		X
	2FPW-V571		X
	2FPW-V581		X
	2FPW-V2071		X
	2FPW-V441		X
	2FPW-V440		X
	2FPW-V1060		X
	2FPW-V1062		X
	2FPW-V1064		X
	2FPW-V1061		X
	2FPW-V680		X
	2FPW-V675		X
	2FPW-V676		X
	2FPW-V677		X
9.5-1c	2FPW-V185	X	
	2FPW-V195	X	
	2FPW-V199	X	
	2FPW-V201	X	
	2FPW-V210	X	
	2FPW-V211	X	
	2FPW-V779	X	
	2FPW-V780	X	
9.5-1d	2FPW-V442	X	
9.5-1e	2FPW-V266	X	
	2FPW-V270	X	
	2FPW-V271	X	
	2FPW-V272	X	
	2FPW-V287	X	
	2FPW-V288	X	
	2FPW-V289		X
	2FPW-V297	X	
	2FPW-V303	X	
	2FPW-V304	X	
	2FPW-V305	X	
	2FPW-V306	X	
	2FPW-V307		X
	2FPW-V486	X	
	2FPW-V487	X	
	2FPW-V492	X	

NMP Unit 2 USAR

TABLE 9A.3-15 (Cont'd.)

<u>FSAR Figure No.</u>	<u>Valve No.</u>	<u>Supervision</u>	
		<u>Electric</u>	<u>Administrative</u>
9.5-1e (cont'd.)	2FPW-V493	X	
	2FPW-V495	X	
	2FPW-V496	X	
	2FPW-V579		X
	2FPW-V795		X
	2FPW-V796		X
	2FPW-V267	X	
	2FPW-V299		X
	2FPW-V300		X
	2FPW-V815		X
	2FPW-V816		X
9.5-1f	2FPW-V301		X
	2FPW-V314	X	
	2FPW-V316	X	
	2FPW-V317	X	
	2FPW-V318	X	
	2FPW-V354	X	
	2FPW-V356		X
	2FPW-V382	X	
	2FPW-V390	X	
	2FPW-V400		X
	2FPW-V401		X
	2FPW-V402		X
	2FPW-V403		X
	2FPW-V404		X
	2FPW-V405		X
	2FPW-V406		X
	2FPW-V407		X
	2FPW-V408		X
	2FPW-V469		X
9.5-1g	2FPW-V423	X	
	2FPW-V424	X	
	2FPW-V427	X	
	2FPW-V428	X	
	2FPW-V429	X	
	2FPW-V430		X
	2FPW-V431		X
	2FPW-V474		X
	2FPW-V475		X
	2FPW-V476		X
	2FPW-V477		X
	2FPW-V529	X	
	2FPW-V530		X
	2FPW-V531		X
	2FPW-V532		X

NMP Unit 2 USAR

TABLE 9A.3-15 (Cont'd.)

<u>FSAR Figure No.</u>	<u>Valve No.</u>	<u>Supervision</u>	
		<u>Electric</u>	<u>Administrative</u>
9.5-1g (cont'd.)	2FPW-V553	X	
	2FPW-V629		X
	2FPW-V662	X	
	2FPW-879	X	
	2FPW-888	X	
9.5-1h	2FPW-V718	X	
	2FPW-V719	X	
	2FPW-V720		X
	2FPW-V721	X	
	2FPW-V770	X	
	2FPW-V353		X
	2FPW-V357	X	

NMP Unit 2 USAR

TABLE 9A.3-16

AVERAGE FIRE LOADING ON EITHER
SIDE OF NON-UL LABELLED DOORS

<u>Door No.</u>	<u>Average Fire Loading On Either Side of Door</u>
SA175-3	0 min/10 min*
R175-4	1 min*/17 min
R175-5	1 min*/17 min
R175-7	1 min*/2 min*
T277-20	11 min/31 min
T277-21	11 min/31 min
T277-22	11 min/31 min
ET214-2	0 min/1.6 hr*
ET237-1	0 min/0 min
SW261-14	31 min/22 min
DG272-4	0 min/10.4 hr*
C288-1	1 min/0 min
C306-1	1 min/0 min
C261-1	2.2 hr*/1.8 hr*
R240-7	58 min*/0 min
AB261-3	24 min/59 min
R240-3	55 min*/58 min*
SA240-1	55 min*/0 min
RR261-2	1.2 hr*/0 min*
C239-1	0 min/0 min
SW280-1	22 min/14 min
R240-2	1.0 hr*/53 min*
RR261-4	2 min*/41 min*
RW265-5	9 min*/1.2 hr*
R289-2	0 min/47 min*
R289-3	33 min*/56 min*
SW261-9	31 min/2.0 hr*
NS250-1	1.5 hr*/1.9 hr*
R261-2	1.1 hr/33 min
SG261-3	0 min/18 min

* Automatic suppression provided on this side of door.

NMP Unit 2 USAR

TABLE 9A.3-17

COMPARISON BETWEEN UL-LABELED CLASS A DOORS AND UNIT 2 NONLABELED SPECIAL PURPOSE DOORS

Item	UL-Labeled 3-Hr Door RGF. No. R3658 (Class A Hollow Metal)	Special Purpose Doors (Watertight)	Special Purpose Doors (Tornado)	Special Purpose Door (Reactor Building Railroad Access)
Door construction	Composite construction - 1 3/4" thick 16-gauge cover sheets with 1 5/8" thick mineral wool insulation and 20-gauge reinforcing ZEES (6" O.C.).	1 1/4" solid steel plate.	Composite construction - 1 7/8" thick 2 3/16" cover sheets of A36 with 1 1/2" thick fiberglass insulation and 1 1/2" x 9/16 x 3/16" bar channels all around the periphery of the doors.	Composite construction - 6 1/4" thick, 11-gauge cover sheets with 6" thick fiberglass insulation and C6 x 8.2 A36 steel channels in the skeleton and around the periphery of the door.
Lock bolts	Mortised lock or latch sets with one single-point spring-actuated bolt (5/8" x 1"), notched for nylon inserts (5/8" or 3/4" throw).	Six 1 1/4" square CF1018 steel bolts with a 2 1/2" throw; two at each jamb and one each at head and sill. Bolt housings of 3" x 5 1/4" x 1 7/8" A36 steel stock.	Two 1" lock bolts, ASTM A1219 UNSG1215 steel - min. tenable 76 ksi, 1" throw. Latch strike made of super oilite at operating temperature of up to 200°F. Bushings on the lock are bronze in excess of 50 ksi.	Two 1 1/2" diameter locking pins, AISI CF1018 steel, with four 1/2" diameter ASTM A490 hex bolts on mounting brackets, one each at head and sill.
Hinges	1 1/2 or 2 pairs of 4 1/2" x 4 1/2" x 0.180" ball bearing butt hinges - with 1/4" or 5/16" pins with bolts.	2 hinges with 1" diameter pin and thrust bearing, welded to structural steel angle frame.	Two heavy-duty hinge assemblies, welded to the door frame and secured to the doors.	Six hinges with 2" diameter steel pin and thrust bearing welded to the structural steel angle frame.
Frame	14-gauge pressed steel frame with adjustable anchors	A36 steel angles for sill, head, and jambs welded together and stiffened with gusset plates, as required.	A36 steel channels three sides with bar stops weld to the channels to prevent flame propagation.	A36 steel angles and plates for jambs welded to the embedded plates in the wall.
Field installation	Pressed steel frame anchored to wall with 14-gauge adjustable jamb anchors at 24 in O.C.	A36 steel angle frame continuously fillet welded to existing embedded frame.	Channel frame intermittent welded to the existing embedded frame.	A36 steel frame intermittent fillet welded to existing embedded frame.

NMP Unit 2 USAR

TABLE 9A.3-17 (Cont'd.)

Item	Special Purpose Doors (Radiation Shielding)	Special Purpose Doors* (Oversized Equipment)	Special Purpose Doors (Pressure-tight)
Door construction	4" solid steel plate.	Same	Composite construction 3 1/4" thick with 1/8" thick cover sheet over 3" x 1 3/8" x 3/16" channels, 3" thick mineral wool insulation.
Lock bolts	Two 1 1/4" diameter CF1018 steel locking pins at latch jamb. Lock bolt keeper of 8" x 4" x 1/2" A36 steel angle.	Same	Two 1 1/4" square CR1018 steel locking pins.
Hinges	Two hinges with 1 1/2" diameter pin and thrust bearing welded to structural steel angle frame.	Same	Two hinges with 1 1/2" diameter CR1144 steel pins welded to structural steel angle frame.
Frame	Angle 6" x 4" x 1/2" for sill, head and jambs bolted and stitch welded to embedded angles.	Same	Angle 8" x 8" x 1/2" for head and jambs with C 2" x 1" x 3/16" channel door stops.
Field installation	A36 steel angle frame flush bolted to embedded angle and stitch welded to embedded angle.	Same	Angle frame anchored to concrete with 1/2" diameter expansion anchors.

NMP Unit 2 USAR

TABLE 9A.3-17 (Cont'd.)

Item	Special Purpose Doors (High Pressure)	Special Purpose Door (Turbine Building Railroad Access)	Special Purpose Door (Secondary Containment Airlock Door No. R261-2)
Door construction	1/2" A36 steel plate with 5/16" thick angle and ST 2.5 x 5 structural tee external stiffeners.	Composite construction 16-gauge steel face sheets over 16-gauge internal stiffeners and 14-gauge 2" deep channel around the door perimeter. 1.5" thick fiberglass insulation.	Composite construction 11-gauge steel face sheets sandwiched over seven channel-shaped horizontal internal stiffeners 2.5" deep x 1.25" x 11-gauge steel with a box-shaped stiffener around the door perimeter. The top and bottom perimeter stiffeners are 2.5" x 1.37" x 11-gauge steel, the latch side stiffener is 2.5" x 6" x 11 gauge and the hinge side stiffener is 2.5" x 5" x 11-gauge steel. The door's core is filled with mineral wool insulation. Steel material is ASTM A607 Gr. 50.
Latch bolts	Ten 7/8" diameter lock bolts located on both sides of the door.	Electrically operated with mechanical lock.	Electrically operated with a manual override. This is UL-listed.
Hinges	Two hinges with 3/4" diameter hinge pin. Hinge is welded to the door	Galvanized hinges connect each vertically sliding door section.	Three heavy-duty hinge assemblies bolted to the door and the frame with four 3/16"-16 counter-sunk head machine screws per leaf. Hinge pin is 5/8" diameter.
Frame	5" x 3" x 3/8" angle welded to embedded angle.	5" x 3" x 1/4" angle bolted to embedded plate and channel welded to structural steel column.	11-gauge pressed steel frame 9" x 2" with 3/4" nose. ASTM A607 Gr. 50 material.
Field installation	A36 steel angle continuously welded to the embedded frame.	Angle bolted to embedded plate and channel, roller track bolted to angle.	Pressed steel frame anchored to concrete wall by 3/8" diameter concrete anchor bolts @ 21" on-center.

* Doors R289-2 and R289-3 are required to have fire exit hardware installed for personal safety. Due to height limitations for installation of fire exit hardware, these doors cannot be classified as UL-rated assemblies. The doors were purchased as UL-rated Class B fire doors, and the hardware was purchased as 3-hr rated.

Door RW265-5 (oversized equipment) has been certified by the manufacturer to be constructed in accordance with UL-labeled fire doors. However, this size door has not been UL fire tested.

Door R261-2 (airlock pressure door) has been certified by the manufacturer to be constructed in accordance with UL-labeled fire doors. However, this size door has not been UL fire tested.

Door SW261-9 (oversized rolling steel door) has been certified by the manufacturer to be of the same construction as a UL-labeled rolling steel door.

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-18 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-18 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-18 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-18 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

TABLE 9A.3-18 (Cont'd.)

Security-Related Information Figure Withheld Under 10 CFR 2.390

NMP Unit 2 USAR

TABLE 9A.3-19

YARD FIRE HYDRANTS AND ASSOCIATED EQUIPMENT*

<u>Location</u>	<u>Hydrant Number</u>
115-kV Yard	FH 14
115-kV Yard	FH 10
General Yard	FH 8
General Yard	FH 11

* Fire hydrant equipment shall be available at the Operations Building (west end) (backup equipment located in the Unit 1 Administration Building vestibule) to establish an effective hose stream. The equipment shall include:

- 200' of 1-1/2" fire hose
- Two 1-1/2" adjustable spray nozzles
- Two universal spanners
- Two adapters - 2-1/2" to 1-1/2" (unless pre-attached to hydrants)
- One hydrant wrench

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TABLE 9A.3-20

FIRE HOSE STATIONS

<u>Location</u>	<u>Elevation</u>	<u>Hose Rack Identification</u>
Control Bldg.	214'-0"	FHR 118
Control Bldg.	214'-0"	FHR 119
Control Bldg.	237'-0"	FHR 113
Control Bldg.	237'-0"	FHR 117
Control Bldg.	250'-0"	FHR 30
Control Bldg.	261'-0"	FHR 116
Control Bldg.	261'-0"	FHR 112
Control Bldg.	288'-6"	FHR 111
Control Bldg.	288'-6"	FHR 115
Control Bldg.	306'-0"	FHR 114
Control Bldg.	306'-0"	FHR 110
Diesel Generator Bldg.	261'-0"	FHR 22
Diesel Generator Bldg.	261'-0"	FHR 33
Reactor Bldg.	175'-0"	FHR 74
Reactor Bldg.	175'-0"	FHR 90
Reactor Bldg.	175'-0"	FHR 100
Reactor Bldg.	198'-0"	FHR 102
Reactor Bldg.	198'-0"	FHR 101
Reactor Bldg.	198'-0"	FHR 103
Reactor Bldg.	215'-0"	FHR 73
Reactor Bldg.	215'-0"	FHR 89
Reactor Bldg.	215'-0"	FHR 99
Reactor Bldg.	240'-0"	FHR 72
Reactor Bldg.	240'-0"	FHR 88
Reactor Bldg.	240'-0"	FHR 98
Reactor Bldg.	261'-0"	FHR 71
Reactor Bldg.	261'-0"	FHR 79
Reactor Bldg.	261'-0"	FHR 87
Reactor Bldg.	261'-0"	FHR 94
Reactor Bldg.	289'-0"	FHR 70
Reactor Bldg.	289'-0"	FHR 78
Reactor Bldg.	289'-0"	FHR 86
Reactor Bldg.	289'-0"	FHR 93
Reactor Bldg.	306'-0"	FHR 69
Reactor Bldg.	306'-0"	FHR 77*
Reactor Bldg.	315'-10"	FHR 140
Reactor Bldg.	328'-10"	FHR 68
Reactor Bldg.	328'-10"	FHR 76
Reactor Bldg.	328'-10"	FHR 85
Reactor Bldg.	328'-10"	FHR 92
Reactor Bldg.	353'-10"	FHR 67
Reactor Bldg.	353'-10"	FHR 75

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TABLE 9A.3-20 (Cont'd.)

<u>Location</u>	<u>Elevation</u>	<u>Hose Rack Identification</u>
Reactor Bldg.	353'-10"	FHR 84
Reactor Bldg.	353'-10"	FHR 91
Aux. Bay North	175'-0"	FHR 97
Aux. Bay North	198'-0"	FHR 104
Aux. Bay North	215'-0"	FHR 96
Aux. Bay North	240'-0"	FHR 95
Aux. Bay South	175'-0"	FHR 83
Aux. Bay South	198'-0"	FHR 82
Aux. Bay South	215'-0"	FHR 81
Aux. Bay South	240'-0"	FHR 80
Screenwell Bldg.	261'-0"	FHR 56
Elec. Tunnels	210'-0"	FHR 137
Elec. Tunnels	214'-6"	FHR 135
Elec. Tunnels	214'-6"	FHR 136
Elec. Tunnels	214'-6"	FHR 139
Elec. Tunnels	220'-6"	FHR 138
* FHR 140 augments FHR 77.		

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TABLE 9A.3-21

TYPICAL FIRE-RATED FLOOR SYSTEM

UL-Rated Section D904	Nine Mile Point Unit 2	Remarks/Justification
Restrained assembly	Restrained assembly	Meets UL design
Steel beam - W10x29, minimum size	Steel beam - varies from W8x18 (minimum) to W36x300	Meets or exceeds UL design in most cases
Nominal concrete thickness - 6 3/4 in for 3-hr rating	Nominal concrete thickness - 8-in minimum provided	Exceeds UL design
Concrete density - 147 PCF	Concrete density - 150 PCF	Exceeds UL design
Minimum reinforcement - 6x6 - 6x6 WWF	Minimum reinforcement - #6 at 12 in C/C	Exceeds UL design
Concrete comp. strength - 3500 psi	Concrete comp. strength - varies from 5000 psi to 3000 psi	Meets or exceeds UL design in most cases
Steel floor forms - composite (nonstructural)	Steel floor forms - composite (nonstructural)	Meets UL design
Steel floor forms - type Epicore CR ft - 1 1/2 or 2 in deep, 22 gage, by Epic Metal Corp.	Steel floor forms - Q deck sec. 3 or sec. 21, to 18 gage minimum by N. N. Robertson	Exceeds UL design
Aggregates - carbonates or silicious	Aggregates - silicious	Meets UL design
Fireproofing material - sprayed fiber or cementitious mixture per manufacturer's instructions around steel beam(s)	Fireproofing material - cementitious mixture per manufacturer's instructions around steel beam(s)	Meets UL design