9.5 Other Auxiliary Systems

9.5.1 FIRE PROTECTION SYSTEM

The purpose of the fire protection program is to ensure the capability to safely shutdown the reactor, maintain it in a safe shutdown condition, continue to control radioactive releases to the environment, and to prevent personnel injury and property damage in the event of a fire.

The fire protection program consists of design features, personnel, equipment, and procedures to provide defense-in-depth protection of public health and safety. The program is implemented during station operations by the prevention, detection, annunciation, confinement, and extinguishment of fire. Administrative controls, training, inspection, testing, and quality assurance ensure the operability of this program.

9.5.1.1 Design Basis

9.5.1.1.1 Defense-in-Depth

The defense-in-depth concept is extended to the design and operation of the fire protection program. This principle is applied to achieve the following objectives:

a) Prevention of fires through the control and separation of ignition sources;

b) Prompt detection and suppression of fires in areas containing safety-related equipment or high combustible loadings;

c) Confinement of fires to their areas of initiation by provision of fire barriers, spatial separation, administrative procedures, and segregation of combustibles; and

d) Protection of redundant safe shutdown equipment and associated cabling to ensure post-fire shutdown capability

9.5.1.1.2 Program Objectives

The primary objectives of the fire protection program is to minimize the probability and consequences of postulated fires. The program requires passive and active fire protection features to provide assurance that the systems necessary to achieve and maintain safe plant shutdown, with or without off-site power, will remain available.

Protection of the plant's areas and zones is based on the fire hazards present. Primary fire protection capability is provided by automatic or manual fire suppression systems, fire detection systems, and rated fire barriers. Total reliance is not placed on a single fire suppression system. Appropriate backup, such as hose stations and portable fire extinguishers, are provided throughout the plant to limit the extent of fire damage. Personnel protective equipment and air breathing apparatus are strategically located for use by plant personnel. Ingress and egress to areas allow for manual fire suppression activities by the fire brigade.

9.5.1.1.3 Combustible Material Fire Exposures and Fire Loading Criteria

The following descriptions are given of quantities and types of in situ combustible materials expected to be present in the plant to identify where combustible liquids, solids, and gases may exist in sufficient quantities to create significant fire hazard exposures. Analytical guidelines used in developing combustible loadings and the potential fire severities are as follows:

a) Combustible Liquids

1) Fuel Oil

(a) Two Diesel Generator Fuel Oil Storage Tanks contain approximately 41,400 gallons of diesel oil each. These tanks and associated piping are designed to seismic Category I, ASME Section III, Code Class Three requirements and are protected against the full range of design basis natural phenomena, thus minimizing the chances of an oil spill. These tanks are enclosed in concrete vaults which are part of the Reactor Auxiliary Building at Wing Area Elevation -35.00 ft msl. These tanks are separated by 208 ft and are located at opposite sides of the Reactor Auxiliary Building.

(b) Two Diesel Generator Feed Tanks contain approximately 610 gallons of diesel oil each. These tanks and associated piping are built to the same standards as the fuel oil storage tanks. These tanks are segregated from other plant areas and from each other by concrete walls and are on Elevation +46.00 ft msl of the Reactor Auxiliary Building.

→ (DRN 99-2227)

(c) The auxiliary boiler area is located outdoors south of the Turbine Building. A 100,000 gallon fuel oil storage tank is located 50 ft south of the Turbine Building and approximately 230 ft away from any structure housing safety-related systems. The Turbine Building houses no safety-related equipment. A dike, capable of containing the full tank capacity, and mobile foam protection is provided.

← (DRN 99-2227)

2) Lubricating Oils

(a) Reactor Coolant Pumps

Each of the four reactor coolant pumps is serviced by a separate lubricating oil system, containing approximately 195 gallons of oil. All equipment associated with the oil system is integrally mounted on the pump itself. This eliminates the need for long runs of exposed connecting piping to separately mounted components, thus minimizing the chances of an oil spill.

The reactor coolant pumps are equipped with an oil collection system, designed, engineered and installed to ensure that failure of the oil collection system does not lead to fire during normal or design basis accident conditions. The oil collection system consists of leak-proof enclosures which encompass all externally located oil bearing components such that potential oil leakage from components

will be contained and drained to an oil collection tank in a safe location. See Section 9.5.1.2.6 for additional description of the oil collection system.

(b) Safety-related Pumps

Safety-related pumps are located at Elevation -35.00 ft msl of the Reactor Auxiliary Building. The quantity of lubricating oil contained in the reservoirs, which are an integral part of the various pumps, ranges from a few quarts to approximately 13 gallons.

(c) Turbine Generator

The turbine generator lubricating oil tank and associated equipment are located in the Turbine Building, at Elevation +15.00 ft msl. The Turbine Building is segregated from areas containing safety systems by fire walls having a fire rating of three hours.

(d) Diesel Generators

→(EC-9506, R302)

The two diesel generators are located at Elevation +21.00 ft msl of the Reactor Auxiliary Building. The diesel generators are segregated from each other and each unit is isolated from other station areas as described in the “Fire Area-By-Fire Area analysis” (Section 9.5.1.3.2). The crank case and auxiliary components of each diesel generator contains 1485 gallons of lubricating oil.

←(EC-9506, R302)

(e) Batch Tanks

The two lube oil batch tanks are located in the yard, at grade elevation, approximately 20 ft south of the Turbine Building. The tanks are located approximately 200 ft away from any structure housing safety-related systems. Each tank has a capacity of 21,210 gallons. A curb is provided around the tanks and the lube oil transfer pumps to contain an oil spill, and mobile foam protection is also available.

(f) Feedwater Pump Turbines

The lube oil system for,each of the two.steam generator feedwater pump turbines contains approximately 650 gallons of lubricating oil. The turbines and their associated lube oil reservoirs are located in the Turbine Building at Elevation +15.00 ft msl and are segregated from other areas containing safety-related systems by fire walls having a fire rating of three hours.

3) Cleaning Fluids

Cleaning fluids required for use in the plant are kept in approved safety cabinets and stored in areas where safety-related systems and components are not exposed.

a) Combustible Solids

1) Electrical Cable Insulation

All cabling used in the plant is specified to meet the flame test requirements of IEEE 383-1974, "IEEE Standard Type Test of Class IE Electrical Cables, Field Splices, and Connections for Nuclear Power Generating Stations, or the equivalent."

2) Charcoal Filters

Charcoal filters are utilized in various HVAC systems throughout the plant. These filters are wholly contained in pressure tight HVAC filter cabinets. Under normal conditions, the decay heat from captured radioactive particles would be insufficient to cause self-ignition of the charcoal bed. However, to protect against the unlikely event that decay heat from radioactive particles may be significant, charcoal temperatures are maintained below self-ignition levels by passing forced air through the filter train. In order to provide the air filtration systems with additional protection, units with large amounts of charcoal are provided with a manually activated water spray system.

3) Office Supplies and Furnishings

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Most plant offices are in the Administration, Generation Support and Maintenance Support Buildings which are separated from the stations nuclear island. Those offices located in the nuclear island typically contain metal office furniture, charts, reference documents, and office supplies (including a limited supply of paper), required in various office areas in the nuclear island are stored in metal cabinets.

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4) Plant Records Storage

The majority of the plant records are stored outside of the protected area. Record storage within the plant is minimal. Adequate protection is provided as described in the Fire Area-By-Fire Area Analysis.

5) Pipe and Duct Thermal Insulations

Materials utilized have a flame spread and fuel contribution of 25 or less and smoke generation of 50 or less as determined by standard test ASTM E-84.

6) Ion Exchange Resins

Ion exchange resins are stored in bulk in the warehousing areas. Only the amounts of resin needed for imediate use are taken to the resin fill stations, located at Elevation +21.00 ft msl of the Reactor Auxiliary Building.

b) Combustible Gases

1) Stored Hydrogen (H_2)

Gases, including hydrogen, are stored in bulk in the gas storage area, located approximately 150 feet from any safety-related structures. Gases stored in this area are not considered to be a fire hazard posing a threat to safety-related structures.

2) Hydrogen From Batteries

Small amounts of H_2, would be generated by the station service batteries during the various service conditions. The ventilation systems serving the battery rooms maintain the H 2 concentration within the rooms at well below the specified limits of two percent by volume.

3) Hydrogen for Main Generator Rotor

Hydrogen gas is used to cool the main generator rotor. There are approximately 445 cubic feet of hydrogen within the generator when the unit is at rest. The generator, located on the operating floor (EL. +67.00 ft msl) of the Turbine Building, is segregated from areas containing safety-related systems by 100 ft.

c) Transient Combustible Materials

The use of transient combustibles in plant operating areas is closely controlled by administrative procedures.

The Fire Area-By-Fire Area Analysis (Subsection 9.5.1.3.2) postulates transient combustible exposure fires that could adversely affect structures, systems or components important to safety. These fires are evaluated and fire protection features are provided to ensure attainment of both hot and cold shutdown.

d) Fire Area and Fire Zone Combustible Loading Guidelines

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1) Heat release characteristics of cable trays have been established based on information obtained from the manufacturers.

2) The quantity of lubricating oil in each fire area/zone, is the combined capacities of oil reservoirs and/or the postulated spillage from oil piping in each area. The potential fire durations for in situ combustibles including lube

←

oil is discussed in the Fire Area-By-Fire Area Analysis.

The heat release associated with the limited amounts of lubrication grease and surface paint utilized in various station fire area/zones has been considered to be insignificant.

3) Interior finish materials, listed by a nationally recognized testing laboratory for flame spread and fuel contribution of 25 or less and smoke generation of 50 or less when tested according to ASTM E-84, "Surface Burning Characteristics of Building Materials," have not been included in the combustible inventory of the fire areas/zones.

4) Transient combustible materials have been considered in fire areas/zones where such materials realistically may be introduced during station operation and maintenance and are analyzed in the Fire Area-By-Fire Area Analysis.

9.5.1.1.4 Applicable Codes, Standards, and Guidelines

The following codes, standards, and regulatory guidelines have been used, as applicable, in the preparation and implementation of the Fire Protection Program:

National Fire Protection Association Standards

1. NFPA 4-1971, "Organization of Fire Services."
2. NFPA 4A-1976, "Fire Department Organization."
3. NFPA 6-1974, "Industrial Fire Loss Prevention."
4. NFPA 7-1974, Fire Emergencies Management."
5. NFPA 8-1974, "Effects of Fire on Operation, Management Responsibility."
6. NFPA 10-1978, "Portable Fire Extinguishers."
7. NFPA 13-1976, "Sprinkler Systems."
8. NFPA 14-1971, "Standpipe and Hose Systems."
9. NFPA 15-1973, "Water Spray Fixed Systems."
10. NFPA 20-1972, "Centrifugal Fire Pumps."
11. NFPA 24-1970, "Outside Protection."
12. NFPA 26-1976, "Supervision of Valves."
13. NFPA 27-1975, "Private Fire Brigade."
14. NFPA 30-1976, "Flammable Combustible Liquids Code."
15. NFPA 49-1975, "Hazardous Chemicals Data."
16. NFPA 5OA-1973, "Gaseous Hydrogen Systems."
17. NFPA 72D-1975, "Proprietary Signaling Systems."
18. NFPA 72E-1974, "Automatic Fire Detectors."
19. NFPA 80-1977, "Fire Doors and Windows."

20. NFPA 194-1979, "Fire Hose Connections."

21. NFPA 196-1979, "Fire Hose."

22. NFPA 197-1966, "Initial Fire Attack, Training Standard On."

23. NFPA 204-1968, "Smoke and Heat Venting Guide."

24. NFPA 232 AM-1972, "Archives and Record Centers."

25. NFPA 251-1972, "Fire Tests, Building Construction and Materials."

26. NFPA 255-1972, "Building Materials, Test of Surface Burning Characteristics."

27. NFPA 601-1975, "Guard Service in Fire Loss Prevention."

28. NFPA 803-1978, "Fire Protection-for Nuclear-Power Plants."

29. NFPA "Fire Protection Handbook" 14th Edition.

U.S. Nuclear Regulatory Comission Documents

1. Regulatory Guide 1.39, "Housekeeping Requirements for Water-Cooled Nuclear Power Plants" September, 1977.

2. Regulatory Guide 1.52, "Design Testing and Maintenance Criteria for Engineered Safety Features Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants" June 1973.

3. Regulatory Guide 1.75, "Physical Independence of Electrical Systems" January 1975.

4. Regulatory Guide 1.88, "Collection Storage, and Maintenance of Nuclear Power Plant Quality Assurance Records" October 1976.

5. Regulatory Guide 1.101, "Emergency Planning for Nuclear Power Plants" November 1975.

6. Appendix A to the Branch Technical Position APCSB 9.5-1.

7. Branch Technical Position ASB 9.5-1, Rev 1.

8. 10 CFR Part 50, Sections 50.48, Appendix A - General Design Criterion 3 and Appendix R.

Other Documents

1. ASTM E-84-75, "Surface Burning Characteristics of Building Materials."

2. ASTM E-119-73, "Fire Test of Building Construction and Materials" July 1974.

3. ASTM E-648, "Floor Radiant Panel Test."

4. IEEE 383-1974, "IEEE Standard Type Test of Class IE Electric Cables, Field Splices and Connections for Nuclear Power Generating Stations," April 15, 1974.

5. NELPIA-MAERP (American Nuclear Insurers-ANI) "Standard Method of Fire Tests of Cable and Pipe Penetration Fire Stops."

9.5.1.1.5 Radioactive Materials

Spent ion exchange resins, and contaminated charcoal and HEPA filters are stored in closed metal containers, located in areas free from ignition sources and combustibles where direct impingement of flames is not likely to occur. Administrative procedures limit the quantity of and time that these materials may be stored. These precautions ensure that in the event of a fire the release of radioactivity to the environment in quantities in excess of that permitted by regulatory guidelines does not occur.

9.5.1.2 Systems Description

9.5.1.2.1 Fire Containment

Fire areas/zones and boundaries are based on the distribution of combustible materials, location of safety-related systems and equipment, and architectural layouts as required for the functional operation of the plant, separation of redundant essential safe shutdown components, and manual firefighting access by station personnel. Service penetrations through fire barriers are sealed as required to maintain the fire resistive integrity of the barrier penetrated. A detailed discussion of the boundaries and service penetrations for each fire area/zone is presented in the Fire Area-By-Fire Area Analysis.

a) Fire Area/Zone Boundaries

Each designated fire area/zone is enclosed in walls, floors, and ceilings (roofs) of reinforced concrete or of 8 inch filled or 12 inch non-filled concrete block construction. The fire resistance rating of area boundaries is generally three hours. Fire zones are subdivisions of fire areas and are normally peripheral rooms associated with the latter, reflecting particular types of fire protection features.

The fire resistance rating,requirement for fire walls is based on the total fire loading (Btu/ft.) within the fire area/zone assuming total consumption of all combustibles. Fire severity is based on 80,000 Btu/hr.

b) Service Penetrations Through Fire Area/Zone Boundaries

1) Ventilation

Ductwork penetrations through fire area/zone boundary walls, floors, and ceilings are externally sealed to provide fire resistance rating of three hours. The following requirements, as applicable, are met:

(a) ASTM E-119,

(b) ANI Penetrations Seal Bulletin

(c) UL 555, and

(d) Manufacturer’s damper installation instructions as approved by UL for damper listing.

Penetration functions are indicated in the Fire Area-By-Fire Area Analysis as:

E - Exhaust
R - Return
S - Supply
T - Transfer Grill
OAI - Outside Air Intake
SV - Smoke Vent

Fire dampers are provided in safety class duct openings and in non-nuclear ductwork penetrations through 3-hour fire rated walls, floors, and ceilings as itemized in the Fire Area-By-Fire Area Analysis. An exception to Section III.G.2 of Appendix R has been granted for fire damper installation details based on LP&L letters W3P84-0709 and W384-1560, dated March 26 and June 5, 1984.

2) Penetrations

Penetrations through fire area/zone boundary walls are sealed with assemblies having a fire resistance rating equal to or greater than the barrier or as evaluated under Generic Letter 86-10. The requirements of ASTM E-119 and of the ANI Penetration Seal Bulletin are met where required.

3) Electrical Cable Penetrations

The fire-stop assemblies at electrical cable penetrations through ceilings, floors, and fire area boundary walls are designed to provide a fire resistance rating equal to, or greater than the barrier rating. The requirements of ASTM E-119 and the ANI Penetration Seal Bulletin are satisfied as required. Cable derating at firestops is not considered necessary due to conservative cable design.

Electrical cable tray spatial separation satisfies the requirements of Regulatory Guide 1.75 (Revision 1, January 1975) as discussed in Section 8.3.

4) Internal Conduit Seals

Internal conduit seals are provided (where required) to prevent the passage of flame, smoke, and hot gases.

c) Ingress and Egress

1) Personnel access openings penetrating barriers between fire areas/zones are protected by fire door assemblies with a fire resistance rating equal to, or greater than the barrier rating. Fire doors are delineated in Table 9.5-1-1 and provided with the following designations:

(a) "A" label - has fire resistance rating of 3 hours
(b) "B" label - has fire resistance rating of 1-1/2 hours
(c) Letter of equivalence - these doors cannot be classified as "A" or "B" label due to modifications required for specific plant needs; manufacturers certify that these doors are constructed in accordance with UL requirements and therefore can be used as fire doors.

(d) Other.

2) Equipment hatches between fire area boundaries are provided with removable covers or swinging door arrangements which have a 3-hour structural steel fireproofing installed on the bottom side of the hatch.

d) Fire Retardant Barriers

Fire retardant barriers are used to isolate and protect exposed cables from exposure fires if separation and other means do not suffice. Fire retardant barrier applications are indicated in the Fire Area-By-Fire Area Analysis. Cable barriers are protective barriers for Class IE electrical circuits (cable trays, conduits, cable air drops, and junction boxes) required for safe plant shutdown following a fire. Firebreaks are provided to prevent the propagation of a fire along the length of a loaded vertical cable tray. A protective barrier provides a one-hour fire resistance and is of water retardant construction. The use of a cable tray firebreaks is described below:

1) Vertical Cable Trays

Firebreaks are provided at a maximum of 15-foot intervals of run of cable tray (regardless of existence of sprinkler systems in the area), except where vertical runs of cable tray have sprinklers dedicated to tray protection (i.e., cable vault and electrical penetration areas).

2) Horizontal Cable Trays

Horizontal cable trays do not require firebreaks.

9.5.1.2.2 Fire Detection and Suppression

a) Design Basis for Fire Protection System

The Fire Protection System (FPS) is designed to provide the following:

1) A reliable supply of water of suitable quality for firefighting purposes, in quantities sufficient to satisfy the maximum probable demand.

2) A reliable pumping system for delivering this water to all station fire water suppression systems at the required flow rates and residual pressures.

3) A sufficient number of yard fire hydrants strategically located to provide large fire hose stream protection for all station buildings and other fire hazards in the yard area.

4) One and one half inch standpipe connections for manually operated small fire hose streams located throughout the station.

5) Portable fire extinguishers of the proper types located throughout all areas of the station to provide a first defense against small incipient fires.

6) Automatic sprinkler or water spray systems installed, where warranted, based on combustible loading and safe shutdown analyses.

7) Heat and/or smoke detection for areas not subject to routine observation and which contain combustible materials and/or safety-related equipment.

b) Description of Fire Protection System

The fire detection and fire suppression systems for the various plant areas are delineated in the Fire Area-By-Fire Area Analysis. A flow diagram illustrating the fire water suppression systems is shown on Figure 9.5.1-1. Fire water suppression and detection systems are detailed below:

1) Water Supplies

Water is supplied for fire protection by three horizontal centrifugal fire pumps located in a fire pump house. A jockey pump is also provided for fire main pressure maintenance. All pumps take suction from two 260,000 gallon vertical ground level water storage tanks. The fire pump suction piping and valving arrangement is designed so that all fire pumps can take suction from either or both tanks, thereby permitting one tank to remain in service while the other tank is out of service. A leak in one tank will not cause drainage of both tanks. Each tank contains adequate storage capability to satisfy the demand requirements of any fire protection system installed in areas housing or exposing safety-related equipment. An additional allowance of 500 gpm has been included for simultaneous operation of manual hose streams for a total duration of two hours.

The demand and water storage requirements of the fire protection system are summarized below:

→(DRN 01-497)

SAFTY-RELATED AREA OF LARGEST DEMAND	GPM HYD. CALC	DURATION	STORAGE REQUIRED
-4 RAB Corridors FPM-22	730.7	120 min	87,684 gallons
Simultaneous operation of manual hose streams	500	120 min	60,000 gallons
Total GPM and storage reqd.	= 1230.7	120 min	147,684 gallons

←(DRN 01-497)

→(DRN 01-497)
A total water storage capacity of 147,684 gallons is required. The designed 260,000 gallon water storage tanks have a usable volume of 253,077 gallons each. Therefore, these tanks provide 100% redundancy, ensuring that adequate water storage is always available should one tank fail. The makeup water supply to the water storage tanks is capable of filling either tank within an 8-hour period. The tanks are filled directly from the potable water system or by pumps drawing suction from the Primary Water Treatment System clear well, which is supplied with either filtered Mississippi River water or Parish water.
→(DRN 00-703)
The fire water distribution system is used as a tertiary backup for lubricating and cooling of the circulating water pumps (CWP's).
←(DRN 01-497; 00-703)

2) Fire Pumps

→(DRN 01-497)

Each of three fire pumps (one electrical motor driven and two diesel engine driven) are rated at 2,000 gpm at 100 psig discharge pressure. The jockey pump is rated at 30 gpm at 122 psig discharge pressure. The fire pumps are located in cubicles within a fire pump house which are separated from each other by 3-hour fire rated walls. The fire pumps and controllers are Underwriters Laboratories (UL) Inc. listed and are installed in accordance with the National Fire Protection Association (NFPA) Std No. 20. All pumps are operated by pressure switches which are located within their respective controllers.

←(DRN 01-497)

The pumps function as follows:

(a) The electrical motor driven jockey pump operates as required to maintain the yard fire main pressure at 135 psig.

(b) If the yard fire main pressure drops to 125 psig, the electric motor driven fire pump automatically starts.

(c) If the fire main pressure continues to drop-and-reaches 115 psig, one diesel engine driven fire pump automatically starts. The remaining diesel engine driven fire pump automatically activates on a further drop in system pressure to 105 psig.

The following remote audible and visual alarms are provided in the Control Room as appropriate for each fire pump:

(a) Pump running,

(b) Driver availability,

(c) Pump failure to start,

(d) Power failure, and

(e) Trouble - high temperature, low oil pressure, loss of power to battery chargers, and overspeed shutdown.

3) Fire Protection Water Distribution Systems

→ (DRN 99-1018)

The water distribution system consists of underground yard piping serving all plant yard fire hydrants, sprinkler systems, water spray systems, and interior standpipe systems. The underground piping forms a complete fire loop around the plant. Post indicator type sectionalizing control valves are installed in the main fire loop to facilitate system maintenance and repair without placing the entire loop out of service. Branch connections from the fire main to all systems are provided with isolation valves to minimize the need for closing sectionalizing valves on the main fire loop. Valves which are part of the Containment Isolation System are controlled as described in subsection 6.2.4. All other valves in the water supply system are locked in their normal position with strict key control procedures. Administrative controls and surveillance procedures are applied to all fire protection valves.

← (DRN 99-1018)

The fire pumps discharge into a 10" diameter loop system through one 12 inch and two 10 inch feed mains. The yard mains are installed in accordance with the guidelines of NFPA Std No. 24. The RAB and Turbine Building have internal loops with multiple feeds from the external loop.

4) Yard Fire Hydrants

Approved yard fire hydrants with curb box type valves are connected to the yard fire mains. Each fire hydrant is adequately serviced by hose houses located either adjacent to the hydrant or within 250 feet from any hydrant. Hose houses are equipped with four 50-foot lengths of 2-1/2" diameter fire hose, four 50-foot lengths of 1-1/2" diameter fire hose either rolled or racked approved nozzles, and other auxiliary equipment. Hydrants are Underwriters Laboratory Inc. listed, compression type, equipped with two 2-1/2" valved hose connections. National standard fire hose threads are used throughout the plant.

5) Interior Standpipe Systems

→(DRN 03-578, R12-C)

A standpipe system is installed in all plant structures to serve a sufficient number of 1-1/2" fire hose connections. The number and location of fire hose connections are such that all areas of fire potential can be reached with no more than 100 ft of hose attached to any hose connection. The standpipe risers have been hydraulically matched to the outlet, hose and nozzle to provide at least one effective hose stream to each plant area. Most standpipe risers are supplied with water from fire water headers which have multiple feeds. The headers are valved in such a way that no single failure can impair both primary and backup fire suppression systems. The effects of a postulated pipe rupture in the pressurized fire protection system piping within safety-related areas has been analyzed in accordance with the requirements of the Branch Technical Positions APCSB 3-1 and MEB 3-1.

←(DRN 03-578, R12-C)

Fire hose racks are installed at each hose connection. The hose racks support a maximum of 100 feet of 1-1/2" fire hose attached to the standpipe hose connection. Hose nozzles approved for use on energized electrical equipment are used throughout the plant with the exception of EL. +46 of the FHB where solid stream hose nozzles are used.

→(DRN 99-1018, R11; 03-993, R13)

Dry hose stations are provided in the Containment Building. Water supply to these hose stations is controlled through the actuation of the pre-action control valves located outside of the containment. This actuation is attained by automatic detection systems inside the containment; and/or by manual release at the local control panels; and/or remotely, by the Control Room operator, manually at the FDMCP.

←(DRN 99-1018, R11; 03-993, R13)

6) Portable Fire Extinguishers

Portable fire extinguishers are provided throughout all station areas. The number, type and location of portable fire extinguishers, and the installation and maintenance of these portable fire extinguishers are in accordance with the guidelines of NFPA Std No. 10.

7) Water Suppression Systems

Based on the area combustible loading including postulated transient combustible materials, automatic water suppression systems are provided to protect safety-related systems and components. These areas are protected by one of the following types of water suppression systems:

(a) Wet pipe sprinkler system,

→(DRN 03-993, R13)

(b) Pre-action sprinkler system

(c) Deleted

←(DRN 03-993, R13)

Manually activated water spray systems are provided for charcoal filter units E-17 (3A-SA and 3B-SB), E-22 and E-23 (3A-SA and 3B-SB) located at EL. +46 ft msl (RAB 2), and E-13 (3A and 3B) located in the Reactor Containment Building.

→ (DRN 99-1018)

Water is supplied to all suppression systems from the outside underground fire loop through the use of 8" piping connections with post indicating isolation valves (excluding the Service Building). All suppression system isolation valves are locked in their normally open positions.

← (DRN 99-1018)

8) Fire Detection Systems

Fire and smoke detection systems are designed to provide rapid detection and location of any fire so that a prompt fire response can be instituted.

Areas of primary concern are all safety-related and/or those containing moderate amounts of combustibles such as H&V equipment areas, switchgear, motor control centers, containment electrical penetration areas, and areas throughout the plant containing low-to-moderate concentrations such as cable tray runs and lubricated equipment.

The fire detection system is designed to the requirements of NFPA 72D, as clarified in Subsection 9.5.1.3.1.

→ (DRN 99-1018)

Primary fire detection system power is from the normal plant AC system. The secondary power source is provided by batteries which are sized to provide at least 24 hours power in the normal condition followed by at least 4 minutes of alarm.

← (DRN 99-1018)

9) Fire Alarm System

→ (DRN 99-1018)

The status of all fire pump controllers, automatic sprinkler and water spray systems, (including their actuating systems), automatic heat and smoke detection systems are continuously monitored in the Control Room.

← (DRN 99-1018)

→(DRN 99-1018, R11)
←(DRN 99-1018, R11)

c) Failure Modes and Effects Analysis

A study of various failure modes and their effects on the operation of the fire suppression systems is detailed in Table 9.5.1-2 and summarized below:

1) Total reliance is not placed on any single automatic fire suppression system. Appropriate backup capability is provided in all areas of the plant.

2) The single failure criterion for the fire water pumping system is satisfied. Redundant fire pumps (one motor driven and two diesel engine driven), each with independent controllers and discharge piping, are provided. Pumps take suction from a valved common header supplied from the two fire water storage tanks.

3) Failures or breaks in fire protection piping systems are analyzed in accordance with Branch Position APCSB 3-1 and MEB 3-1.

4) The single failure criterion for sprinkler and standpipe systems is satisfied. Sprinkler system risers and standpipe risers are fed from cross headers (located inside the buildings) which are fed from each end through separate connections to the yard loop. No single failure can impair both primary and backup fire protection systems in an area.

9.5.1.2.3 Smoke Venting

Products of combustion and smoke that may develop as a result of fires occurring in various areas throughout the station are controlled and discharged to a safe location as required to facilitate manual firefighting capability.

Emergency use of smoke exhaust fan systems (smoke ejectors) are available for the controlled removal of heat, smoke, and other products of combustion.

Inadvertent operation of any ventilation systems designed for smoke removal does not violate or interfere with controlled area isolation requirements of containment functions required for the protection of the public and for maintaining habitability for operating personnel.

The smoke venting systems provided for various buildings are:

a) Reactor Auxiliary Building

→(EC-5000081435, R301)

1) This building (exclusive of Switchgear Rooms, Cable Vault, Electrical Penetration Areas, and Control Room Complex) is provided with a 100% outdoor air main ventilation system consisting of supply air handling units and an exhaust air handling unit containing a filter train of medium efficiency filters, HEPA filters and activated charcoal adsorbers.

←(EC-5000081435, R301)

Products of combustion and smoke that may be generated are removed from the building through the RAB exhaust air handling unit during its normal mode of operation. This exhaust unit has the capability of purging the RAB building. Products of combustion and smoke that may be radioactive are monitored using radiation monitors at the ventilation system discharge.

2) The Cable Vault, Switchgear Areas, and Electrical Penetration Areas are supplied conditioned air from two air handling systems, each containing redundant units which have medium efficiency filters, electric heating coils, and chilled water cooling coils. The Cable Vault, Switchgear Areas, and Electrical Penetration Areas are also provided with smoke exhaust fans specifically for purging smoke and products of combustion. Makeup air required for purging is furnished by the air handling systems.

b) Containment Building

Smoke venting of the Containment Building is accomplished through the use of the containment purge system. Makeup air required for purging is drawn into the containment through the purge air intake.

c) Fuel Handling Building

Smoke venting of the Fuel Handling Building, including spent fuel handling areas, is accomplished using the building ventilation system normal mode of operation.

This ventilation system consists of a 100% outside air supply air handling unit with electric heating coil and medium efficiency filters and two exhaust fans. One exhaust fan is a standby fan providing a 100% redundancy. Whenever products of combustion and smoke generated in the spent fuel handling areas are radioactive, they are routed through the spent fuel handling area emergency air handling unit containing a filter train of medium efficiency filters, HEPA filters and activated charcoal adsorber prior to release to the environment.

d) Control Room

The Control Room is provided with exhaust fans designed for purging smoke and products of combustion when the need arises. Makeup air is drawn in through the intake ducts of the Control Room.

The toilet exhaust fan and the conference room exhaust fans (under certain modes of operation) can be operated to exhaust smoke from the Control Room, Computer Room raised floor and Emergency Living Quarters. Makeup air would be brought in through the normal outside air intake.

Smoke venting for each fire area/zone is described in the Fire Area-By-Fire Area Analysis. In addition to the fixed exhaust capability, portable smoke exhaust fans (smoke ejectors) are provided for use by the fire brigade.

9.5.1.2.4 Drainage

Water discharged from fire suppression systems is handled by the floor drain systems. Radiologically controlled areas are routed to the Waste Management Systems. Other areas are routed directly to the Yard Storm Water Drainage System. Drainage capabilities for each individual fire areas/zones are described in the Fire Area-By-Fire Area Analysis. The equipment and floor drain systems are discussed in Subsection 9.3.3.

9.5.1.2.5 Emergency Lighting

→(DRN 02-1071, R12-A)

Emergency lighting is provided in areas needed for manual operation of hot safe shutdown equipment and the access and egress routes thereto. Emergency battery packs are designed to provide a minimum of eight hours of lighting and are automatically energized following a loss of Normal/Emergency AC lighting. All of the battery packs in safety-related areas are seismically supported.

←(DRN 02-1071, R12-A)

9.5.1.2.6 Reactor Coolant Pump Oil Collection System

A Reactor Coolant Pump Oil Collection System is provided for each pump to direct lube oil from pressurized and unpressurized leakage sites such as lift pump and piping, overflow lines, lube oil cooler, oil fill and drain lines and plugs, flanged connection in oil lines and lube oil reservoirs to a collection tank. Normally empty remote fill lines are not protected by the oil collection system as approved by a deviation from Section III.0 of Appendix R to 10CFR Part 50. The RCP Oil Collection System is designed, engineered, and installed such that failure will not lead to a fire during normal or design basis accident conditions and that the system will withstand a safe shutdown earthquake. The RCP Oil Collection System consists of oil drip pan enclosures mounted on each reactor coolant pump motor. A gravity drain piping system transports any accumulated oil from the drip pan enclosures to an oil collection tank. There are two 200 gallon oil collection tanks. One tank serves pumps RCP 1A and RCP 1B, the other tank serves pump RCP 2A and RCP 2B. The tanks are located inside the reactor containment building outside the biological shield wall at EL. -400 ft msl. Each tank is vented and provided with a flame arrester. Each tank is furnished with a glass liquid level gauge to provide local indication of existence of oil in the tank. Each taak is capable of collecting oil from one RCP oil lube system.(195 gallons). Each RCP motor lube oil system has an alarm which will sound in the Control Room to alert operators if a significant amount of oil is lost from the lube oil reservoirs.

9.5.1.3 Safety Evaluation

9.5.1.3.1 Detailed Comparison to Appendix "A" to the Branch Technical Position APCSB 9.5-1, Rev. 0

The following is a comparison of the Waterford Unit 3 Fire Protection Program with the guideline criteria of Appendix "A" to the BTP APCSB 9.5-1, Rev 0. In most cases, NRC guidelines or recommended alternatives to the guidelines have been satisfied. Alternative means of fire protection have been developed and utilized in addressing the suggested criteria where required to accommodate existing design restrictions and to reflect actual operating conditions anticipated in the plant.

A. Overall Requirements of Nuclear Plant Fire Protection Program

1. Personnel

Responsibility for the overall fire protection program should be assigned to a designated person in the upper level of management. This person should retain ultimate responsibility even though formulation and assurance of program implementation is delegated. Such delegation of authority should be to staff personnel prepared by training and experience in fire protection and nuclear plant safety to provide a balanced approach in directing the fire protection programs for nuclear power plants. The qualification requirements for the fire protection engineer or consultant who will assist in the design and selection of equipment, inspect and test the completed fire physical aspects of the system, develop the fire protection program, and assist in the firefighting training for the operating plant should be stated. Subsequently, the FSAR should discuss the training and the updating provisions such as fire drills provided for maintaining the competence of the station firefighting and operating crew, including personnel responsible for maintaining and inspecting the fire protection equipment.	The Fire Protection Program (UNT-005-013) describes LP&L's plant control over the Fire Protection Program for Waterford Unit 3. The fire protection responsibility for the initial design and construction of the station lies with Ebasco Services Incorporated (Ebasco), under control of the Nuclear Project Manager (LP&L). Fire Protection Specialists of Middle South Services Incorporated (MSS) have reviewed the station fire protection equipment specifications and witnessed preoperational acceptance testing of the Fire Protection System. The Fire Protection Specialists from MSS assisted in the development of the fire protection program.

The fire protection staff should be responsible for:	
(a) Coordination of building layout and systems design with fire area requirements, including consideration of potential hazards associated with postulated design basis fires.	(a) During initial design and construction, this responsibility lies with Ebasco under the control of the Nuclear Project Manager (LP&L).During operations, this responsibility is with the station staff as described in the Fire Protection Program.
(b) Design and maintenance of fire detection, suppression, and extinguishing systems.	Same as (a) above.
(c) Fire prevention activities.	
(d) Training and manual fire-fighting activities of plant personnel and the fire brigade.	Same as (a) above.
	Same as (a) above.

2. <u>Design Bases</u>

The overall fire protection program should be based upon evaluation of the potential fire hazards throughout the plant and the effect of postulated design basis fires relative to maintaining the ability to perform minimize radioactive releases to the environment.	The fire protection program is based on an evaluation of potential fire hazards throughout the plant and the effect of postulated in situ and/or transient combustible exposure fires relative to maintaining the ability to perform safe shutdown functions and minimize radioactive releases to the environment. The design bases of these goals are directed toward: 1) Fire Prevention through the control, separation and guarding of sources of ignition. 2) Fire limitation by means of fire cutoffs and barriers to either confine any fire to the area in which it may occur or to prevent fire from communicating to and endangering safety-related and/or essential equipment required for safe shutdown.

3) Fire detection in areas containing safety-related equipment or areas of high combustible loading to give early warning of fires so that such fire may be extinguished in their incipient stages.

4) Fire extinguishment by means of installed facilities commensurate with the fire hazard present.

3. Backup

Total reliance should not be placed on a single automatic fire suppression system. Appropriate backup fire suppression should be provided.

Total reliance is not placed on any single fire suppression system, automatic or manual. A full complement of appropriate capability portable fire extinguishers are installed throughout the plant to provide either initial firefighting capacity or backup to any automatic or manual suppression system. As a backup to portable fire extinguishers and manual or automatic suppression systems, a system of 1-1/2 inch hose connections is installed throughout so that all areas within each building are reached within 100 feet of this hose attached to a standpipe connection. As a final backup to all of the protection outlined above, outside yard hydrants and hose houses are also provided.

4. <u>Single Failure Criterion</u>

A single failure in the fire suppression system should not impair both the primary and backup fire suppression capability. For example, redundant fire water pumps with independent power supplies and controls should be provided. Postulated fires or fire protection system failures need not be considered concurrent with other plant accidents or the most severe natural phenomena. The effects of lightning strikes should be included in the overall plant fire protection system.

A single failure in the water supplied fire suppression system will not impair both the primary and backup fire suppression capability. Three fire pumps, one electric motor and two diesel engine driven, provided with multiple valved suction and discharge lines, supply water to the underground yard loop.

The pump suction lines are connected by a common header, which is sectionalized.

The fire protection system piping and supply are designed to withstand natural phenomena in accordance with the Uniform Building Code.

	Lighting protection is provided in accordance with the National Fire Protection Association Std 78.
5. Fire Suppression Systems	
Failure or inadvertent operation of the fire suppression system should not incapacitate safety-related systems or components. Fire suppression systems that are pressurized during normal plant operation should meet the guidelines specified in APCSB Branch Technical Position 3-1, "Protection Against Postulated Piping Failures in Fluid Systems Outside Containment."	Postulated breaks in the pressurized fire protection system piping are analyzed in accordance with MEB 3-1 and APCSB 3-1. Essential equipment required for safe shutdown are adequately protected against incapacitation by the operation of the Fire Suppression System.
6. Fuel Storage Areas	
The fire protection program (plans, personnel and equipment) for buildings storing new reactor fuel and for adjacent fire zones which could affect the fuel storage zone should be fully operational before fuel is received at the site.	All aspects of the fire protection program for the Fuel Handling Building required for storing new reactor fuel is operational.
7. Fuel Loading	
The fire protection program for an entire reactor unit should be fully operational prior to initial fuel loading in that reactor unit.	The plant Fire Protection Program was operational prior to fuel loading.
8. Multiple-Reactor Sites	
On multiple reactor sites where there are operating reactors and construction of remaining units is being completed, the fire protection program should provide continuing evaluation and include additional fire barriers, fire protection capability, and administrative controls necessary to protect the operating units from construction fire hazards. The superintendent of the operating plant should have the lead responsibility for site fire protection.	Not applicable.

9. Simultaneous Fires	
Simultaneous fires in more than one reactor need not be postulated, where separation requirements are met. A fire involving more than one reactor unit need not be postulated except for facilities shared between units.	Not applicable.
B. Administrative Procedures, Controls and Fire Brigade	
1. Administrative procedures consistent with the need for maintaining the performance of the fire protection system and personnel in nuclear power plants should be provided.	The Fire Protection Program (UNT-005-013), discusses the organization and methodology developed for maintaining the performance of fire protection systems and fire response personnel at the station.
2. Effective administrative measures should be implemented to prohibit bulk storage of combustible materials inside or adjacent to safety-related buildings or systems during operation or maintenance periods. Regulatory Guide 1.39, "Housekeeping Requirements for Water-Cooled Nuclear Power Plants," provides guidance on housekeeping, including the disposal of combustible materials.	Effective measures are established and implemented as indicated in the Fire Protection Program.
3. Normal and abnormal conditions or other anticipated operations such as modifications (e.g., breaking fire stops, impairment of fire detection and suppression systems) and refueling activities should be reviewed by appropriate levels of management and appropriate special actions and procedures such as fire watches or temporary fire barriers implemented to assure adequate fire protection and reactor safety. In particular:	Appropriate reviews are conducted and appropriate actions taken as indicated in the Fire Protection Program.

(a)	Work involving ignition sources such as welding and flame cutting should be done under closely controlled conditions. Procedures governing such work should be reviewed and approved by persons trained and experienced in fire protection. Persons Performing and directly assisting in such work should be trained and equipped to prevent and combat fires. If this is not possible, a person qualified in fire protection should directly monitor the work and function as a fire watch.	Adequate review, control and training are provided as indicated in the Fire Protection Program and related fore protection procedures referenced in the program.
(b)	Leak testing, and similar procedures such as air flow determination, should use one of the commercially available aerosol techniques. Open flames or combustion generated smoke should not be permitted.	See the Fire Protection Program.
(c)	Use of combustible material, e.g., HEPA and charcoal filters, dry ion exchange resins or other combustible safety-related areas should be controlled. Use of wood inside buildings containing safety-related systems or equipment should be permitted only when suitable non-combustible substitutes are not available. If wood must be used, only fire retardant treated wood (scaffolding, lay down blocks) should be allowed into safety-related areas only when they are to be used immediately. Their possible and probable use should be considered in the fire hazard analysis to determine the adequacy of the installed fire protection systems.	Adequate controls are provided as indicated in the Fire Protection Program.

4. Nuclear power plants are frequently located in remote areas, at some distance from public fire departments. Also, first response fire departments are often volunteer. Public fire department response should be considered in the overall fire protection program. However, the plant should be designed to be self-sufficient with respect to firefighting activities and rely on the public response only for supplemental or backup capability.	The Fire Protection Program coordinates firefighters activities with the public fire department.
5. The need for good organization, training and equipping of fire brigades at nuclear power plant sites requires effective measures be implemented to assure proper discharge of these functions. The guidance in Regulatory Guide 1.101, "Emergency Planning for Nuclear Power Plants," should be followed as applicable.	Fire emergencies are handled in accordance with the Fire Protection Program.
(a) Successful firefighting requires testing and maintenance of the fire protection equipment, emergency lighting and communication, as well as practice as brigades for the people who must utilize the equipment. A test plan that lists the individuals and their responsibilities in connection with routine tests and inspections of the fire detection and protection systems should be developed. The test plan should contain the types, frequency and detailed procedures for testing. Procedures should also contain instructions on maintaining fire protection during those periods when the fire protection system is impaired or during periods of plant maintenance, e.g., fire watches or temporary hose connections to water systems.	See the Fire Protection Program.

(b)	Basic training is a necessary element in an effective fire-fighting operation. In order for a fire brigade to operate effectively, it must operate as a team. All members must know what their individual duties are. They must be familiar with the layout of the plant and with equipment location and operation in order to permit effective firefighting operations during times when a particular area is filled with smoke or is insufficiently lighted. Such training can only be accomplished by conducting drills several times a year (at least quarterly) so that all members of the fire brigade have had the opportunity to train as a team, testing itself in the major areas of the plant. The drills should include the simulated use of equipment in each area and should be preplanned and postcritiques to establish the training objective of the drills and determine how well these objectives have been met. These drills should periodically (at least annually) include local fire department participation where possible. Such drills also permit supervising personnel to evaluate the effectiveness of communications within the on scene fire team leader, the reactor operator in the Control Room and the off-site command post.	Adequate training is being provided to ensure a successful firefighting operation as indicated in the Fire Protection Program.

(c) To have proper coverage during all phases of operation, members of each shift crew should be trained in fire protection. Training of the plant fire brigade should be coordinated with the local fire department so that responsibilities and duties are delineated in advance. This coordination should be part of the training course and implemented into the training of the local fire department staff. The local fire department staff should be educated in the operational precautions when fighting fires on nuclear power plant sites. Local fire departments should be made aware of the need for radioactive protection of personnel and the special hazards associated with a nuclear power plant site.	Same as (b) above.
(d) NFPA 27, "Private Fire Brigade" should be followed in organization, training, and fire drills. This standard is also applicable for the inspection and maintenance of firefighting equipment. Among the standards referenced in this document, the following should be utilized: NFPA 194, "Standard for Screw Threads and Gaskets for Fire Hose Couplings," NFPA 196, "Standard for Fire Hose, NFPA 197, "Training Standard on Initial Fire Attacks." NFPA 601, "Recommended Manual of Instructions and Duties for the Plant Watchman on Guard." NFPA booklets and pamphlets listed on page 27-11 of Volume 8, 1971-72 are also applicable for good training references. In addition, courses in fire prevention and fire suppression which are recognized and/or sponsored by the fire protection industry should be initiated.	The standards and guidelines promulgated by the fire protection industry and the applicable government agencies are utilized in the preparation of the Plant Operations Manual (POM), which containsthe implementing procedures for the Fire Protection Program.

C. Quality Assurance Program

Quality Assurance (QA) programs of applicants and contractors should be developed and implemented to assure that the requirements for design, procurement, installation, and testing and administrative controls for the fire protection program for safety-related areas as defined in this Branch Position are satisfied.

The program should be under the management control of the QA organization. The QA program criteria that apply to the fire protection program should include the following:

1. Design Control and Procurement Document Control

   Measures should be established to assure that all design-related guidelines of the Branch Technical Position are included in design and procurement documents and that deviations therefrom are controlled.

2. Instructions, Procedures and Drawings

   Inspections, tests, administrative controls, fire drills and training that govern the fire protection program should be prescribed by documented instructions, procedures or drawings and should be accomplished in accordance with these documents.

3. Control of Purchased Material Equipment and Services

   Measures should be established to assure that purchased material, equipment and services conform to the procurement documents.

Louisiana Power & Light Company (LP&L) has a Corporate Quality Assurance Program in effect which complies with the requirements of Appendix B to 1OCFR50 and follows the guidance of Regulatory Guides and ANSI Standards listed in the Final Safety Analysis Report (FSAR) for Waterford 3, except where alternate conditions are stated in the FSAR. Two exceptions are the Administration Building and the Maintenance Support Building which are “commercial buildings” and their fire protection systems are not included in the QA Program.

→(EC-4606, R302)
The Waterford3 FSAR did not require that LP&L's Preoperational Quality Assurance Program be applied to the Fire Protection Program. At the time of issuance of Appendix A to APCSB BTP 9.5-1, much of the fire protection design was complete. However, since May 15, 1979 the criteria of this appendix has been considered, and is currently documented in the Fire Protection Program (UNT-005-013).
←(EC-4606, R302)

4. Inspection

   A program or independent inspection of activities affecting fire protection should be established and executed by, or for, the organization performing the activity to verify conformance with documented installation drawings and test procedures for accomplishing the activities.

5. Test and Test Control

   A test program should be established and implemented to assure that testing is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. The tests should be performed in accordance with written test procedures; test results should be properly evaluated and acted on.

6. Inspection, Test and Operating Status

   Measures should be established to provide for the identification of items that have satisfactorily passed required tests and inspections.

7. Non-Conforming Items

   Measures should be established to control items that do not conform to specified requirements to prevent inadvertent use or installation.

8. Corrective Action

Measures should be established to assure that conditions adverse to fire protection, such as failures, malfunctions, deficiencies, deviations, defective components, uncontrolled combustible material and non-conformances are promptly identified, reported, and corrected.

9. Records

Records should be prepared and maintained to furnish evidence that the criteria enumerated above are being met for activities affecting the fire protection program.

10. Audits

Audits should be conducted and documented to verify compliance with the fire protection program including design and procurement documents: instructions; procedures and drawings; and inspection and test activities.

D. General Guidelines for Plant Protection

1. Building Design

(a) Plant layouts should be arranged to:

(1) Isolate safety-related systems for unacceptable fire hazards, and

Essential systems required for safe shut-down are isolated from unacceptable fire hazards through the use of physical isolation, spatial separation, automatic suppression or any combination of the above deemed feasible.

(2) Separate redundant safety-related systems from each other so that both are not subject to damage from a single fire hazard.

Redundant essential systems required for safe shutdown are separated from each other by one or a combination of: fire walls, fire rated barriers and coatings, automatic detection, and/or automatic suppression. See the Fire Area-By-Area Area Analysis (Subsection 9.5.1.3.2) for specific details.

	Alternatives a) Redundant safety related systems that are subject to damage from a single fire should be protected by a fire retardant coatings and fire detection and suppression systems, or b) A seperate system to perform the safety function should be provided.	
(b)	In order to accomplish 1.(a) above, safety-related systems and fire hazards should be identified throughout the plant. Therefore, a detailed fire hazard analysis should be made. The fire hazards analysis should be reviewed and updated as necessary.	A Fire Area-By-Fire Area Analysis has been developed to identify, throughout the plant, safety-related systems and associated fire hazards. The fire analysis has been reviewed and updated.
(c)	For multiple reactor sites, cable spreading rooms should not be shared between reactors. Each cable spreading room should be separated from other areas of the plant by barriers (walls and floors) having a minimum fire resistance of three hours. Cabling for redundant safety devisions should be separated by walls having three-hour fire barriers	Not applicable.

(d)	Interior wall and structural components, thermal insulation materials and radiation shielding materials and soundproofing should be non-combustible. Interior finishes should be non-combustible or listed by a nationally recognized testing laboratory, such as Factory Mutual or Underwriters' Laboratory, Inc. for flame spread, smoke and fuel contribution of 25 or less in its use configuration (ASTM E-84 Test), "Surface Burning Characteristics of Building Materials".	Walls and structural materials are non-combustible. Other interior finish materials, including thermal insulation, radiation shielding and soundproofing, are non-combustible or have a flame spread and fuel contribution of 25 or less and smoke development of 50 or less, as defined in ASTM E-84 "Surface Burning Characteristics of Building Materials," except for carpeted areas and the expansion joint at the primary contain-ment wall. The carpeting installed over the raised floor in the Computer Room has a flame spread of 30. The carpeting is of a carpet tile configuration which is inserted into the removable metal floor panels which creates a metal break on all sides of each inserted carpet tile. The carpeting installed in the Control Room proper has a minimum Critical Radiant Flux (CRF) of 0.45 watts per square centimeter as determined by a Flooring Radiant Panel Test. The smoke development criteria of 50 or less is exceeded in some locations, however, such exceptions are considered acceptable due to the minimization of flame spread and fuel contribution. →(EC-25884, R305) A foam expansion joint is located on both sides of the primary containment wall. The foam on the Annulus side is isolated from the Annulus area by a fire retardant sealing compound. The foam on the containment side presents negligible combustible loading of less than 10 seconds. ←(EC-25884, R305)
(e)	Metal deck roof construction should be non-combustible (see the building materials directory of the Underwriters Laboratory, Inc.) or listed as Class I by Factory Mutual System Approval Guide.	Metal deck roofing is not used on safety related structures,
(f)	Suspended ceilings and their supports should be of noncombustible construction. Concealed spaces should be devoid of combustibles.	Suspended ceilings and their supports are non-combustible construction. Concealed spaces are devoid of ordinary combustibles with the exception of minor quantities of low voltage communication wires. Electrical cabling for lighting fixtures and loud speakers is installed in conduits within concealed ceiling spaces.

(g)	High voltage - high amperage transformers installed inside buildings containing safety-related systems should be of the dry type or insulated and cooled with non-combustible liquid.	High voltage-amperage transformers located in safety-related structures are of the dry type.
(h)	Buildings containing safety-related systems should be protected from exposure or spill fires involving oil filled transformers by: locating such transformers at least 50 feet distant; or ensuring that such building walls within 50 feet of oil filled transformers are without openings and have a fire resistance rating of at least three hours.	The oil filled transformers are separated from safety-related structures by at least 50 feet and/or three-hour-fire walls. Automatic water spray deluge suppression systems are provided for the Auxiliary, Start-up, and Main Transformers.
(i)	Floor drains, sized to remove expected firefighting water flow should be provided in those areas where fixed water fire suppression systems are installed. Drains should also be provided in other areas where hand hose lines may be used if such fire-fighting water could cause unacceptable damage to equipment in the area.	Floor drains, and other means of removing water in areas where fixed suppression systems are installed, and where hand hose lines are used, are arranged to remove expected fire water flows with no appreciable accumulation of water in the area. Water buildup will not interfere with the safe shutdown of the plant.
	Equipment should be installed on pedestals, or curbs should be provided as required to contain water and direct it to floor drains. (See NFPA 92M, "Water-proofing and Draining of Floors.")	To preclude water damage, essential equipment required for safe shutdown are mounted on pedestals or provided with curbs.
	Drains in areas containing concombustible liquids should have provisions for preventing the spread of the fire throughout the drain system.	The diesel generator areas have self-containing drains, independent of other station drainage systems, thus precluding the possibility of diesel oil fires spreading to other plant areas.
	Water drainage from areas which may contain radioactivity should be sampled and analyzed before discharge to the environment.	Drainage from areas which may contain radioactivity is directed to the Waste Management System.

	In operating plants or plants under construction, if accumulation of water from the operation of new fire suppression systems does not create unacceptable consequences, drains need not be installed.	
(j)	Floors, walls, and ceilings enclosing separate fire areas should have a minimum fire rating of three hours. Penetrations in these fire barriers, including conduits and piping, should be sealed or closed to provide a fire resistance rating at least equal to that of the fire barrier itself. Door openings should be protected with equivalent rated doors, frames and hardware that have been tested and approved by nationally recognized laboratory. Such doors should be normally closed and locked or alarmed with alarm and annunciation in the Control Room. Penetrations for ventilation system should be protected by a standard "fire door damper" where required. (Refer to NFPA 80, "Fire Doors and Windows.")	Appendix R fire areas are isolated from each other by floors, walls, and ceilings having a fire resistance rating of three hours unless noted otherwise in the Fire Area-By-Area Analysis. Penetrations through fire walls and ceiling/floor assemblies are sealed with systems that are tested and rated for at least the same rating as the fire barrier. Doors through rated fire barriers are UL listed or certified equivalent. These doors are of the self closing or automatic closing type or are normally closed. 1-1/2 or 3-hour rated fire dampers are provided in ventilation duct penetrations between fire areas, unless noted otherwise in the Fire Area-By-Fire-Area Analysis.
	The fire hazard in each area should be evaluated to determine barrier requirements. If barrier fire resistance cannot be made adequate, fire detection and suppression should be provided, such as: (i) water curtain in case of fire. (ii) flame retardant coatings. (iii) additional fire barriers.	(See Subsection 9.5.1.3.2, Fire Area-By Fire Area Analysis.)

2. Control of Combustibles

(a) Safety-related systems should be isolated or separated from combustible materials. When this is not possible because of the nature of the safety system or the combustible material, special protection should be provided to prevent a fire from defeating the safety system function. Such protection may involve a combination of automatic fire suppression, and construction capable of withstanding and containing a fire that consumes all combustibles present. Examples of such combustible materials that may not be separable from the remainder of its sytems are:	Essential equipment required for safe shutdown are isolated or proteced by spatial separation, fire-rated barriers, fire suppression, fire control or any combination of these which provide the necessary degree of protection.
(1) Emergency diesel generator fuel oil day tanks	The diesel fuel oil day tanks are located within concrete vaults, which are separated from other plant areas by three-hour fire barriers. Automatic preaction sprinklers are provided in these areas.
(2) Turbine-generator oil and hydraulic control fluid systems	The turbine-generator lubricating oil tank is located within the Turbine Building, isolated from all safety-related buildings by three-hour rated fire walls. This tank is provided with an automatic water spray system for equipment and property protection.
➔(DRN 01-1459) (3) Reactor coolant pump lube oil system ←(DRN 01-1459)	The reactor coolant pump lube oil systems and reservoirs are an integral part of the reactor coolant pumps located within the containment. The reactor cooling pumps are equipped with oil collection systems as described in Subsection 9.5.1.2.6.

b) Bulk gas storage (either compressed or cryogenic), should not be permitted inside structures housing safety-related equipment. Storage of flammable gas such as hydrogen should be located outdoors in separate detached buildings so that a fire or explosion will not adversely affect any safety-related systems or equipment. (Refer to NFPA 50A, "Gaseous Hydrogen Systems.")	There is no bulk storage of flammable gases inside structures housing safety systems. All such storage is maintained outdoors, away from safety-related equipment.
Care should be taken to locate high pressure gas storage containers with the long axis parallel to building walls. This will minimize the possibility of wall penetration in the event of a container failure. Use of compresses gases (especially flammable and fuel gases) inside buildings should be controlled. (Refer to NFPA 6, "Industrial Fire Loss Prevention.")	Storage of high pressure gases is in the gas storage areas, outside the Reactor Auxiliary Building and away from safety-related equipment. Safe, permitted use of compressed gases is controlled by operational procedures.
(c) The use of plastic materials should be minimized. In particular, halogenated plastics such as polyvinyl chloride (PVC) and neoprene should be used only when substitute non-combustible materials are not available. All plastic materials, including flame and fire retardant materials, will burn with intensity and BTU production in a range similar to that of ordinary hydrocarbons. When burning, they produce heavy smoke that obscures visibility and can plug air filters, especially charcoal and HEPA. The halogenated plastics also release free chlorine and hydrogen chloride when burning which are toxic to humans and corrosive to equipment.	Plastics are not used as a primary construction material, but may be used minimally as accessory material when required. Use of plastic or other combustible interior finish materials within the plant is minimized to the extent practicable. A foam expansion joint is installed long the primary containment wall as described in Subsection 9.5.1.3.1.D.1(d).
(d) Storage of flammable liquids should, as a minimum, comply with the requirements of NFPA 30, "Flammable and Combustible Liquids Code."	The guidelines of NFPA 30 are followed for the storage of flammable liquids within safety-related areas.

3. Electric Cable Construction, Cable Trays and Cable Penetrations

(a)	Only non-combustible materials should be used for cable tray construction.	Cable tray construction materials are non-combustible.
(b)	See Section F.3 for fire protection guidelines for cable spreading rooms.	See Section F.3.
(c)	Automatic water sprinkler systems should be provided for cable trays outside the cable spreading room. Cables should be designed to allow wetting down with deluge water without electrical faulting. Manual hose stations and portable hand extinguishers should be provided as backup. Safety-related equipment in the vicinity of such cable trays, that does not itself require water protection, but is subject to unacceptable damage from sprinkler system operation or discharge should be protected from sprinkler system malfunction.	Automatic sprinkler systems are installed as described in the Fire Area-By-Fire Area Analysis (Subsection 9.5.1.3.2). Essential equipment required for safe shutdown which could be adversely affected by operation of sprinklers has been considered and provisions made such as water stops in horizontal cable trays and sealing of cable tray entries into equipment cabinets.
	When safety-related cables do not satisty the provisions of Regulatory Guide 1.75, all exposed cables should be covered with an approved fire retardant coating and a fixed automatic water fire suppression system should be provided.	To the extent practicable, cable tray seperation criteria complies with the guidlines of Regulatory Guide 1.75. Cable seperation has been analyzed and protection provided as necessary (see Subsection 9.5.1.4).
➜ (d)	Cable and cable tray penetration of fire barriers (vertical and horizontal) should be sealed to give protection at lease equivalent to that fire barrier. The design of fire barriers for horizontal and vertical cable trays should, as a minimum, meet the requirements of ASTM E-119, "Fire Test of Building Construction" and hose stream test. ←	Fire rated penetration seals are provided through rated fire barriers. Fire barrier penetration seals have been tested, and passed, ASTM E-119 fire tests with hose stream tests. Where fire barrier penetrations are not provided with tested seals, an evaluation has been documented by a qualified fire protection engineer.

	When installed penetration seals are deficient with respect to fire resistance, these seals may be protected by covering both sides with an approved fire retardant material. The adequacy of using such material should be demonstrated by suitable testing.	All penetration seals are provided and installed without deficiencies in accordance with approved criteria and testing.
(e)	Fire breaks should be provided as deemed necessary by the fire hazards analysis. Flame retardant coatings may be used as a fire break for grouped electrical cables to limit spread of fire in cable ventings. (Possible cable derating owing to use of such coatings materials msut be considered during design.)	Fire breaks consisting of fire retardant barriers are installed at approximately 15-foot intervals along vertical runs of cable trays that are not protected by directional spray automatic spinkler systems.
(f)	Electric cable construction should, as a minimum, pass the current IEEE No. 383 flame test. (This does not imply that cables passing this test will not require additional fire protection.)	Electric cables are specified to pass the IEEE 383-1974 flame test, or the equivalent.
(g)	To the extent practical, cable construction that does not give off corrosive gases while burning should be used.	To the extent practicable, cabling which does not evolve corrosive gases when overheated or exposed to flame is used.
(h)	Cable trays, raceways, conduit, trenches, or culverts should be used only for cables. Miscellaneous storage should not be permitted, nor should piping for flammable or combustible liquids or gases be installed in these areas.	Cable trays, raceways, conduit, trenches, or culverts are used only for cables. Miscellaneous storage is not permitted, nor piping for flammable or combustible liquids or gases installed in these areas.
(i)	The design of cable tunnels, culverts and spreading rooms should provide for automatic or manual smoke venting as required to facilitate manual firefighting capability.	The ventilation systems for the Cable Spreading Room and Electrical Penetration Areas can be aligned for operation to facilitate smoke removal from these areas. Also, portable smoke ejectors are provided for use by the fire brigade.

(j) Cables in the Control Room should be kept to the minimum necessary for operation of the Control Room. All cables entering the Control Room should terminate there.	All cables entering the Control Room terminate there.
Cables should not be installed in floor trenches or culverts in the Control Room.	Cables are not installed in floor trenches or culverts in the Control Room.
Existing cabling installed in concealed floor and ceiling spaces should be protected with an automatic total flooding Halon system.	The only electrical cabling installed in concealed ceiling spaces are power cables for lighting fixtures and loudspeakers, and these cables are installed in conduits and thus do not require any special protection. The only electrical cabling installed in concealed floor spaces is in the computer room and this underfloor area is monitored by an automatic fire detection system.

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4. <u>Ventilation</u>

(a) The products of combustion that need to be removed from a specific area should being evaluated to determine how they will be controlled. Smoke and corrosive gases should generally be automatically discharged directly outside to a safe location. Smoke and gases should generally be automatically discharged directly outside to a safe location. Smoke and gases containing radioactive materials should be monitored in the fire area to determine if release to the environment is within the permissible limits of the plant Technical Specifications.	Ventilation systems for each fire area are capable of being aligned for operation for smoke removal. Portable smoke ejectors are provided for use by the fire brigade. The Fire Area-By-Fire Area Analysis develops the potential for fire in areas containing radioactive equipment or materials. In the unlikely event that a fire were to start in these areas, smoke and gases would be monitored using the existing radiation monitors at the ventilation system discharge.
(b) Any ventilation system designed to exhaust smoke or corrosive gases should be evaluated to ensure that inadvertent operation or single failures will not violated the controlled areas of the plant design. This requirement includes containment functions for protection of the public and maintaining habitability for operations personnel.	Ventilation systems designed to exhaust smoke or corrosive gases have been evaluated to ensure that inadvertent operation or single failures will not violate the controlled areas of the plant design.

(c)	The power supply and controls for mechanical ventilation systems should be run outside the fire area served by the system.	Power supply and controls for ventilation systems are outside of the areas served (to the extent practicable), with the exception of the Control Room.
(d)	Fire suppression systems should be installed to protect charcoal filters in accordance with Regulatory Guide 1.52, "Design Testing and Maintenance Criteria for Atmospheric Cleanup Air Filtration."	In accordance with criteria given in Regulatory Guide 1.52, the six air filtration systems in the plant, utilizing charcoal filters, have air temperature monitors (thermistor loops) downstream of the charcoal adsorbers which are indicated in the Control Room. Air is circulated through the charcoal filter units to remove decay heat, maintaining the charcoal well below ignition temperatures. In order to protect the Airborne Radioactivity Removal System (E-13) and to provide additional protection for those units with large amounts of charcoal, manually operated water spray systems are provided for the adsorbers in air filtration systems E-13, E-17, E-22, and E-23. Water supply for the open nozzle spray headers is provided from the fire protection system piping.
(e)	The fresh air supply intakes to areas containing safety-related equipment or systems should be located remote from the exhaust air outlets and smoke vents of other fire areas to minimize the possibility of contaminating the intake air with the products of combustion.	Air supply intakes are physically separated from exhaust air outlets to minimize the possibility of exhausted air being drawn into the supply intakes.
(f)	Stairwells should be designed to minimize smoke infiltration during a fire. Staircases should serve as escape routes and access routes for firefighting. Fire exit routes should be clearly marked. Stairwells, elevators and chutes should be enclosed in masonry towers with minimum fire rating of three hours and automatic fire doors at least equal to the enclosure construction at each opening into the building. Elevators should not be used during fire emergencies.	Stairwells are encased in towers with a two-hour fire rating, as required by the NFPA Life Safety Code, and provided with Class B fire doors with a rating of 1-1/2 hours and 250°F Max. 30 Min. temperature rise to minimize smoke infiltration. Fire exit routes are clearly marked. Exterior stairwell walls with no outside exposure are not considered as fire barriers.

(g)	Smoke and heat vents may be useful in specific areas such as cable spreading rooms and diesel fuel oil storage areas and switchgear rooms. When natural-convection ventilation is used, a minimum ration of 1 sq. foot of venting area per 200 sq. feet of floor area should be provided. If forced-convection ventilation is used, 300 CFM should be provided for every 200 sq. feet of floor area. See NFPA No. 204 for additional guidance on smoke control.	The existing means of ventilation for all plant areas are used for smoke venting. Portable smoke ejectors are provided for use by the fire brigade.
(h)	Self-contained breathing apparatus using full face positive pressure masks, approved by NIOSH (National Institute for Occupational Safety and Health-approval formerly given by the US Bureau of Mines) should be provided for fire brigade damage control, and Control Room personnel. Control Room personnel may be furnished breathing air by a manifold system piped from a storage reservoir if practical. Service or operating life should be a minimum of one half hour for the self-contained units.	Approved self-contained breathing units with minimum capacity of one-half hour are provided as necessary for fire-brigade, damage control, and Control Room personnel. In addition, the Control Room personnel can be furnished breathing air by a manifold system piped from the Air Receiver Tank Reservoir System, noted in the paragraph below, by using face masks attached to umbilical tube arrangements.
	At least two extra air bottles should be located on-site for each self-contained breathing unit. In addition, an on-site 6-hour supply of reserve air should be provided and arranged to permit quick and complete replenishment of exhausted supply air bottles as they are returned. If compressors are used as a source of breathing air, only units approved for breathing air should be used. Special care must be taken to locate the compressor in areas free of dust and contaminants.	➜ For fire brigade personnel, two extra air bottles are located on-site for each self-contained breathing unit and are placed in strategic areas in the plant. Also, 60 additional SCBA air bottles are maintained on-site for replenishment of exhausted air bottles in order to provide a 6 hour supply of reserve air. The control room Emergency Breathing Air system utilizes a compressor which is approved for breathing air. This compressor is located in the (-)35 East Cooling Tower area. ➜

(i) Where total flooding gas extinguishing systems are used, area intake and exhaust ventilation dampers should close upon initiation of gas flow to maintain necessary gas concentration. (See NFPA 12, and 12A, "Halon 1301 Systems.")

5. Lighting and Communication

Lighting and two-way voice communication are vital to safe shutdown and emergency response in the event of a fire. Suitable fixed and portable emergency lighting and communication devices should be provided to satisfy the following requirements:

(a) Fixed emergency lighting should consist of sealed beam units with individual 8-hour minimum battery power supplies.

→(DRN 02-1071, R12-A)
AC emergency lighting powered from the diesel generators is provided throughout the station. Areas where hot safe shutdown functions are performed, and access routes to these areas and egress from are provided with fixed 8-hour battery power emergency lighting in accordance with 10CFR50 Appendix R requirements.
←(DRN 02-1071, R12-A)

(b) Suitable sealed beam battery powered portable hand lights should be provided for emergency use.

Portable emergency lights are provided at strategic locations throughout the plant for emergency use.

(c) Fixed repeaters installed to permit use of portable radio communication units should be protected from exposure fire damage.

Voice powered headsets, located throughout the plant, are available for emergency communication. A telephone and paging system is also provided for communication with the plant areas. Hand type portable radios are provided.

(d) Fixed repeaters installed to permit use of portable radio communication units should be protected from exposure fire damage.

The hand type portable radios operate through a single base station repeater, located in the +7 RAB Communications Room of the Reactor Auxiliary Building.

E. Fire Detection and Suppression

→ (DRN 99-1018)

1. Fire Detection

(a) Fire detection systems should, as a minimum, comply with NFPA 72D, "Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems."

← (DRN 99-1018)

Each fire detection system for safety-related plant areas performing either fire detection only, or fire detection/actuation of an automatic suppression system is designed in accordance with Class A circuitry as defined in NFPA-72D.

Fire detection initiating device circuits, for some areas, are arranged such that both redundant circuits are contained in a common raceway for a limited length of the raceway. These areas have been evaluated and found to be acceptable in regards to potential physical damage to the raceway.

→ (DRN 99-0971)
← (DRN 99-0971)

→ (DRN 99-1018)

(b) Fire detection system should give audible and visual alarm and annunciation in the Control Room. Local audible alarms should also sound at the location of the fire.

← (DRN 99-1018)

Fire detection systems give audible and visual alarm in the Control Room. Local notification is provided by the plant paging sytem.

(c) Fire alarms should be distinctive and unique. They should not be capable of being confused with any other plant system alarms.

Fire alarm signals utilize devices to produce sounds distinctive from those of other alarm systems.

→ (DRN 99-1018)

(d) Fire detection and actuation systems should be connected to the plant emergency power supply.

← (DRN 99-1018)

The secondary (emergency) power supply is provided by batteries contained within the individual fire detection/ suppression system control panels.

→(DRN 99-1018, R11)

2. Fire Protection Water Supply Systems

(a) An underground yard fire main loop should be installed to furnish anticipated fire water requirements. NFPA 24-Standard for Outside Protection - gives necessary guidance for such installation. It references other design codes and standards developed by such organizations as the American National Standards Institute (ANSI) and the American Water Works Association (AWWA). Lined steel should be used to reduce internal tuberculation deposits in an unlined pipe over a period of years can significantly reduce water flow through the combination of increased friction and reduced pipe diameter. Means for treating and flushing the systems should be provided. Approved visually indicating sectional control valves, such as Post Indicator Valves, should be provided to isolate portions of the main for maintenance or repair without shutting off the entire system. The fire main system piping should be separate from service or sanitary water system piping.	The guidelines of NFPA 24 are followed in the installation of the underground yard main fire loop. Unlined 10 inch diameter steel pipe is used for the yard main fire loop. The system can be flushed through the yard hydrants. A supplemental 12-inch cement lined cast iron supply main is provided directly from the fire pump house piping arrangement and feeds directly into the Turbine Building Internal 8-inch above-ground loop system. →(EC-35260, R308) 6” Branch piping to hydrants #9 and 10A has been installed using PVC AWWA C900. This material is approved by NFPA 24. ←(EC-35260, R308) Sectional control valves are provided to facilitate system maintenance. Individual isolation valves are provided for each suppression system. Visual indication of position of sectional control valves are provided on the fire main piping. Periodic recorded inspections monitor valve positions. (See the Fire Protection Program Plan.) Fire main piping system is separate from all service or sanitary water piping. (An accepted exception to this is that yard Fire Hydrant #11 can be connected in an emergency to supply makeupwater to the Clearwell Tank or to the discharge of the Circulating Water Pumps Bearing Lube Water Pumps to lubricate and cool equipment on the Intake and Discharge structures.
←(DRN 99-1018, R11)	
(b) A common yard fire main loop may serve multiunit nuclear power plant sites, if cross-connected between units. Sectional control valves should permit maintaining independence of the individual loop around each unit. For such installations, common water supplies may also be utilized. The water supply should be sized for the largest single expected flow. For multiple reactor sites with widely separated plants (approaching 1 mile or more), separate yard main loops should be used.	Not Applicable.

(c) If pumps are required to meet system pressure or flow requirements, a sufficient number of pumps should be provided so that 100% capacity will be available with one pump inactive (e.g., three 50% pumps or two 100% pumps). The connection to the yard main loop from each fire pump should be widely separated, preferable located on opposite sides of the plant. Each pump should have its own driver with independent power supplies and control. At least one pump (if not powered from the emergency diesels) should be driven by non-electrical means, preferably diesel engine. Pumps and drivers should be located in rooms separated from the remaining pumps and equipment by a minimum three-hour fire wall. Alarms indicating pump running, driver availability, or failure to start should be provided in the Control Room.	Three fire pumps, one electric motor driven and two diesel engine driven, provide 100% capacity available with one pump inactive. The pumps are located in separate cubicles on a common fire pump house, separated from each other by three-hour fire barriers. Automatic sprinkler protection is installed in the pump house. The connection to the fire pump discharge the yard fire main loop from are separated. Fire protection system pressure is maintained by an electric motor driven jockey pump. Fire pumps are equipped with independent controllers and automatically start sequentially upon pressure drops in the fire main water system. Alarms indicating pump running, driver availability, power failure, failure to start and pump trouble are provided in the Control Room.
Details of the fire pump installation should, as a minimum, conform to NFPA 20, "Standard for the Installation of Centrifugal Fire Pumps."	The guidelines of NFPA 20 are followed in the fire pump installation.
→(DRN 01-497) (d) Two separate reliable water supplies should be provided. If tanks are used, two 100% (minimum of 300,000 gallons each) system capacity tanks should be installed. They should be so interconnected that pumps can take suction from either or both. However, a leak in one tank or its piping should not cause both tanks to drain. The main plant fire water supply capacity should be capable of refilling either tank in a minimum of eight hours. ←(DRN 01-497)	Two separate 260,000 gallon tanks, each with a 253,077 usable gallon capacity are provided exclusively for the fire protection system. The piping and valve arrangement in such that any or all fire pumps can take suction from either or both tanks. Valves are provided so that a leak in one tank or its associated piping can prevent both tanks from draining. The makeup system to the fire water tanks is capable of filling either tank in less than eight hours.
Common tanks are permitted for fire and sanitary or service water storage. When this is done, however, minimum fire water storage requirements should be dedicated by means of a vertical standpipe for other water services.	Not applicable.

→(DRN 01-497)

(e) The fire water supply (total capacity and flow rate) should be calculated on the basis of the largest expected flow rate for a period of two hours, but not less than 300,000 gallons. This flow rate should be based (conservatively) on 1,000 gpm for manual hose streams plus the greater of:

The fire water supply of 253,077 usable gallons per tank is greater than the demands of two hose stations (500 gpm) plus all sprinkler heads opened within the largest area of application selected for hydraulic design purposes in an area housing or exposing equipment required for safe shutdown. This takes into account the water density requirements for such an area.
Maximum demand will be satisfied for a period of two hours.

←(DRN 01-497)

(1) all sprinkler heads opened and flowing in the largest designed fire area; or

(2) The largest open head deluge system(s) operating.

Not applicable. Fire protection water is provided from tanks.

(f) Lakes or fresh water ponds of sufficient size may qualify as sole source of water for fire protection, but require at least two intakes to the pump supply. When a common water supply is permitted for fire protection and the ultimate heat sink, the following conditions should also be satisfied:

(1) The additional fire protection water requirements are designed into the total storage capacity; and

(2) Failure of the fire protection system should not degrade the function of the ultimate heat sink.

(g) Outside manual hose installation should be sufficient to reach any location with an effective hose stream. To accomplish this, hydrants should be installed approximately every 250 feet on the yard main system. The lateral to each hydrant from the yard main should be controlled by a visually indicating or key operated (curb) valve. A hose house, equipped with hose and combination nozzle, and other auxiliary equipment recommended in NFPA 24, "Outside Protection," should be provided as needed by at least every 1,000 feet.

Fire hydrants are provided at approximately 250 foot intervals along the yard main loop. A curb valve or post indicator valve (PIV) is installed on all hydrant branches. Hose houses as a minimum are equipped with:

(2) Nozzles 1 1/2", 2 1/2
(1) Crowbar
(2) Hydrant Wrenches
(8) Coupling Spanners or
(6) Combination Spanners
(4) Fifty Foot Lengths 1 1/2" Hose
(4) Fifty Foot Lengths 2 1/2" Hose
(2) Gated Wyes or Reducers
(2) Hose Coupling Gaskets

Each fire hydrant is adequately serviced by hose houses located either to the hydrant or within 250 feet from any hydrant.

Threads compatible with those used by local fire departments should be provided on all hydrants, hose couplings and standpipe risers.	National standard fire hose threads are used throughout the plant. Local fire departments use national standard fire hose threads.
3. <u>Water Sprinkler and Hose Standpipe System</u>	
(a) Each automatic sprinkler system and manual hose station standpipe should have and independent connection to the plant underground water main. Headers fed from each end are permitted inside buildings to supply multiple sprinkler and standpipe systems. When provided, such headers are considered an extension of the yard main system. The header arrangement should be such that no single failure can impair both the primary and backup fire protection systems.	Sprinkler system risers and manual hose station standpipe risers are supplied from common header located inside the buildings, fed from each end through connections to the yard loop. Header and divisional valve arrangement is such that no single failure can impair both primary and backup fire protection systems protecting a single fire area.
Each sprinkler and standpipe system should be equipped with OS&Y (outside screw and yoke) gate valve, or other approved shutoff valve, and water flow alarm. Safety-related equipment that does not itself require sprinkler water fire protection, but is subject to unacceptable damage if wetted by sprinkler water discharge should be protected by water shields or baffles.	Each sprinkler system header connection to the building header loop is equipped with an OS&Y (outside screw and yoke) gate valve. Water flow alarm is provided for each sprinkler system. Each manual hose station standpipe riser is equipped with a non-indicating type gate valve. Safety-related equipment required for safe shutdown, which could be adversely affected by operation of sprinklers, has been considered and provisions made such as cable tray, conduit and cable entry seals to inhibit the passage of water into the equipment. In addition, a water barrier is provided at the first horizontal tray run available from a cable tray top entry.

→ (DRN 99-1018)

(b) All valves in the fire water systems should be electrically supervised. The electrical supervision signal should indicate in the Control Room and other appropriate command locations in the plant. (See NFPA 26, "Supervision of Valves.")

← (DRN 99-1018)

→ (DRN 99-1018, R11)

When electrical supervision of fire protection valves is not practicable, an adequate management supervision program should be provided. Such a program should include locking valves open with strict key control; tamper proof seals; and periodic, visual check of all valves.	Fire protection valves are protected under an adequate management supervision program. See the Fire Protection Program.

← (DRN 99-1018, R11)

(c) Automatic sprinkler system should as a minimum conform to requirements of appropriate standards such as NFPA 13, "Standard for the Installation of Sprinkler Systems," and NFPA 15, "Standard for Water Spray Fixed Systems."	The guidelines of NFPA Standard 13 and 15 have been followed in the design of automatic sprinkler and water spray systems.
(d) Interior manual hose installation should be able to reach any location with at least one effective hose stream. To accomplish this, standpipes with those connections, equipped with a maximum of 75 feet of 1-1/2 inch woven jacket-lined fire hose and suitable nozzles should be provided in all buildings, including containment, on all floors and should be spaced at not more than 100-foot intervals. Individual standpipes should be of at least 4-inch diameter for multiple hose connections and 2-1/2 inch diameter for single hose connections. These systems should follow the requirements of NFPA 14, "Standpipe and Hose Systems" for sizing spacing and pipe support requirements.	→(DRN 03-578, R12-C) Inside manual hose stations are provided at maximum 100 foot intervals. These hose stations are equipped with a maximum of 100 feet of 1-1/2 inch woven jacket-lined fire hose with approved nozzles and are capable of reaching any location with an effective hose stream. Adequacy of the 2-inch diameter standpipe risers have been verified and hydraulically matched to the standpipe outlet, hose length and nozzle so as to provide at least one effective hose stream for any plant location. ←(DRN 03-578, R12-C)
Hose stations would be located outside entrances to unoccupied areas and inside normally occupied areas. Standpipes serving hose stations in areas housing safety-related equipment should have shutoff valves and pressure reducing devices (if applicable) outside the area.	Hose stations are provided throughout. All areas in structures housing safety-related systems can be reached with fire hose attached to the standpipe system. Dry-hose stations are provided in the Containment Building. Water supply to these hose stations is controlled by valves located outside the Containment from which the standpipe systems can be charged manually or operated from the Control Room.

(e) The proper type of hose nozzles to be supplied to each area should be based on the fire hazard analysis. The usual combination spray/ straight-stream nozzle may cause unacceptable mechanical damage (for example, the delicate electronic equipment in the Control Room) and be unsuitable. Electrically safe nozzles should be provided at locations where electrical equipment or cabling is located.	Adjustable spray nozzles, approved for use on energized electrical equipment, are provided on interior hose stations. EL. +46 msl in the Fuel Handling Building is provided with solid stream smooth br nozzles on the hose station.
(f) Certain fires, such as those involving flammable liquids, respond well to foam suppression. Consideration should be given to use of any of the available foams for such specialized protection application. These include the more common chemical and mechanical low expansion foams, high expansion foam and the relatively new aqueous film forming foam (AFFF).	Portable (AFFF) aqueous film forming foam firefighting equipment is available on-site for use by the fire brigade.
4. <u>Halon Suppression System</u>	
The use of Halon Fire extinguishing agents should as a minimum comply with the requirements of NFPA 12A and 12B "Halogenated Fire Extinguishing Agent Systems - Halon 1301 and Halon 1211." Only UL or FM approved agents should be used.	Not Applicable
In addition to the guidelines of NFPA 12A and 12B, preventative maintenance and testing of the systems, including check weighing of the Halon cylinders should be done at least quarterly.	Not Applicable
Particular consideration should also be given to:	
(a) minimum required Halon concentration and soak time	Not Applicable
(b) toxicity of Halon	
(c) toxicity and corrosive characteristics of thermal decomposition products of Halon.	

5. Carbon Dioxide Suppression Systems

Carbon dioxide suppression systems are not utilized.

(Details deleted)

6. Portable Extinguishers

Fire extinguishers should be provided in accordance with guidelines of NFPA 10 and 10A, "Portable Fire Extinguishers, Maintenance and Use." Dry chemical extinguishers should be installed with due consideration given to cleanup problems after use and possible adverse effects on equipment installed in the area.

The guidelines of NFPA Std. No. 10 are followed in the selection and installation of portable fire extinguishers.

F. Guidelines for Specific Plant Areas

1. Primary and Secondary Containment

(a) Normal Operation

Fire protection requirements for the primary and secondary containment areas should be provided on the basis of specific identified hazards.

For example:

- Lubricating oil or hydraulic fluid system for the primary coolant pumps
- Cable tray arrangements and cable penetrations
- Charcoal filters

Fire suppression systems should be provided based on the fire hazards analysis.

Fire protection will consist of:

1) Use of electrical cable meeting the specifications of the IEEE-383-1974 flame test, or the equivalent.
2) Partial automatic fire detection that will alarm and annunciate in the Control Room.
3) Partial automatic suppression systems utilizing water as the extinguishing agent.

The following hazards are identified and protection is installed as follows:

➔(DRN 01-1459, R11-B)

Fixed fire suppression capability should be provided for hazards that could jeopardize safe plant shutdown. Automatic sprinklers are preferred. An acceptable alternate is automatic gas (Halon or CO_2) for hazards identified as requiring fixed suppression protection.

🡐(DRN 01-1459, R11-B)

a) The reactor coolant pumps (RCP's) are provided with an Oil Collection System (see Subsection 9.5.1.2.6).

Operation of the fire protection systems should not compromise integrity of the containment or the other safety-related systems. Fire protection activities in the containment areas should function in conjunction with total containment requirements such as control of contaminated liquid and gaseous release and ventilation.

➔(EC-25884, R305)

b) Electrical cable insulation passing through the annulus and into the Containment at the electrical penetration area is protected by steel sleeve and junction box arrangements. Divisional cable separation meets the guidelines of Regulatory Guide 1.75 whenever practical (see FSAR Chapter 8), and satisfies the flame test requirements of IEEE 383-1974. Strict administrative controls and area configuration are established and arranged to effectively minimize fire hazards in the area. Fire detection is provided for these areas inside primary containment.

🡐(EC-25884, R305)

(b) <u>Refueling and Maintenance</u>

Refueling and maintenance operations in containment may introduce additional hazards such as contamination control materials, decontamination supplies, wood planking, temporary wiring, welding and flame cutting (with portable compressed fuel gas supply). Possible fires would not necessarily be in the vicinity of fixed detection and suppression systems.

The amount of transient fire loading in Containment will be controlled and limited through strict administrative procedures, established to minimize fire hazards in the Containment. See the Fire Protection Program.

Management procedures and controls necessary to assure adequate fire protection are discussed in Section 3a.	
In addition, manual firefighting capability should be permanently installed in containment. Standpipes with hose stations, and portable fire extinguishers, should be installed at strategic locations throughout containment for any required manual firefighting operations.	A standpipe system is provided inside the containment. The standpipe is maintained dry during normal operations, but can be charged from the Control Room. Fire extinguishers are distributed inside the Containment as required.
Adequate self-contained breathing apparatus should be provided near the containment entrances for firefighting and damage control personnel. These units should be independent of any breathing apparatus or air supply systems provided for general plant activities.	Adequate self-contained breathing apparatus are available for the fire brigade to use when entering Containment.
(c) An enclosure may be required to confine the agent if a gas system is used. Such enclosures should not adversely affect safe shutdown, or other operating equipment in containment.	c) The two charcoal filter systems in the Containment are located in totally enclosed HVAC filter cabinets. Under normal conditions the decay heat from captured radioactive particles is insufficient to cause self-ignition of the charcoal bed, but in the unlikely event of possible temperature increases, forced air passed through the filter train maintains the system below self-ignition levels. Additional protection is provided by thermistor wire heat detection and remotely actuated water spray systems.
→(DRN 00-703)	
→(DRN 01-1459) Fire detection system should alarm and annunciate in the Control Room. The type detection used and the location of the detectors should be most suitable to the particular type of fire that could be expected from the identified hazard. A primary containment general area fire detection capability should be provided as backup for the above described hazard detection. To accomplish this, suitable smoke detection (e.g., visual obscuration, light scattering and particle counting) should be installed in the air recirculation system ahead of any filters. ←(DRN 00-703; 01-1459)	Ionization smoke detectors are installed in the Electrical Penetration areas and alarm and annunciate in the Control Room.

Automatic fire suppression capability need not be provided in the primary containment atmospheres that are inerted during normal operation. However, special fire protection requirements during refueling and maintenance operations should be satisfied as provided below.	The Containment will not be inerted.
2. <u>Control Room</u>	
➜(EC-5000081435, R301) The Control Room is essential to safe reactor operation. It must be protected against disabling fire damage and should be separated from other areas of the plant by floors, walls and roofs having minimum fire resistance ratings of three hours.	The Control Room Complex is separated from other plant areas by floor, walls and a roof having a three-hour fire rating. The Control Room Complex is divided into five zones: a) the Control Room (Proper), b) Control Room H&V Room, c) Emergency Living Quarters, d) Computer Room, and e) cable vault which are separated by at least two-hour rated fire walls and doors.
←(EC-5000081435, R301) Control Room cabinets and consoles are subject to damage from two distinct fire hazards:	
(a) Fire originating within a cabinet or console; and	
(b) Exposure fire involving combustibles in the general room area.	
Manual firefighting capability should be provided for both hazards. Hose stations and portable water and Halon extinguishers should be located in the Control Room to eliminate the need for operators to leave the Control Room. An additional hose piping shutoff valve and pressure reducing device should be installed outside the Control Room.	Adequate portable fire extinguishers are placed within the Control Room. Hose stations are located just outside the Control Room entrances.
Hose stations adjacent to the Control Room with portable extinguishers in the Control Room are acceptable.	

Nozzles that are compatible with the hazards and equipment in the Control Romm should be provided for the manual hose station. The nozzles chosen should satisfy actual firefighting needs, satisfy electrical safety and minimize physical damage to electrical equipment from hose stream impingement.	Nozzles approved for use on energized electrical equipment are provided at hose stations near the Control Room.
Fire detection in the Control Room cabinets, and consoles should be provided by smoke and heat detectors in each fire area. Alarm and annunciation should be provided in the Control Room. Fire alarms in other parts of the plant should also be alarmed and annunciated in the Control Room.	Fire detection in the Control Room is from ionization smoke detectors located throughout the Control Room below the suspended ceiling and in the Main Control Panels, CP-l, 2, 3, 4, 6, 7, 8, 18, 35 and 36. All plant fire alarms are alarmed and annunciated in the Control Room.
Breathing apparatus for Control Room operators should be readily available. Control Room floors, ceiling, supporting structures, and walls, including penetrations and doors, should be designed to a minimum fore rating of three hours. All penetration seals should be airtight.	Self-contained breathing units are provided for Control Room personnel. Penetrations of Control Room floor, walls and ceilings are airtight. Control Room barriers are fire rated as described in the fire area analysis.
Manually operated ventilation systems are acceptable.	Control Room Ventilation system can be switched to a smoke exhaust mode. Activation of the smoke exhaust fan is manual. The Control Room HVAC Room is isolated from the remainder of the Control Room areas and is further protected by an automatic preaction sprinkler system.
Cables should not be located in concealed floor and ceiling spaces. All cables that enter the Control Room should terminate in the Control Room. That is, no cabling should be simply routed through the Control Room from one area to another.	The Control Room has a concealed floor space beneath the raised floor of the Supervisor's office. The space contains a 110V power cable in flexible conduit, two 120V cables and approximately 40 low voltage communication cables. Access to the concealed space is provided by removable panels. The combustible load and lack of continuity of combustibles does not require any special protection. The only electrical cabling installed in concealed ceiling spaces are power cables for lighting fixtures and loudspeakers. These cables are installed in conduits and thus does not require any special protection. All cables entering the Control Room terminate there.

Safety-related equipment should be mounted on pedestals or the Control Room should have curbs and drains to direct water away from such equipment. Such drains should be provided with means for closing to maintain integrity of the Control Room in the event of other accidents requiring Control Room isolation.	Safety equipment inside the Control Room cabinets are maintained above floor level such that nominal accumulations of water will not affect their operation. When necessary, accumulated water on the control Room floor will be removed by manual means. Drains are not installed for this area.
3. <u>Cable Spreading Room</u>	
(a) The preferred acceptable methods are:	
(1) Automatic water system such as closed head sprinklers, open head deluge, or open directional nozzles. Deluge and open spray systems should have provisions for manual operation at a remote station; however, there should be provisions to preclude inadvertent operation. Location of sprinkler heads or spray nozzles should consider cable tray sizing and arrangements to assure adequate water coverage. Cables should be designed to allow wetting down with deluge water without electrical faulting. Open head deluge and open directional spray systems should be zoned so that a single failure will not deprive the entire area of automatic fire suppression capability. The use of foam is acceptable, provided it is to a type capable of being delivered by a sprinkler or deluge system, such as Aqueous Foam Forming Foam (AFFF).	A separate pre-action sprinkler system is the primary means of fire suppression in the isolated Cable Vault, Electrical Penetration Area 'A' and Electrical Penetration Area 'B.' The use of preaction sprinkler systems minimizes the chances of inadvertent operation. Cables are designed to allow wetting without faulting. The pre-action systems have ceiling automatic sprinklers which provide total area, aisle and top cable tray protection. They also provide automatic sprinklers in the cable trays at every level of the cable tray stacks. The closed head sprinkler systems are hydraulically calculated.
(2) Manual hoses and portable extinguishers should be provided as backup.	Manual hose stations and portable extinguishers are provided as backup to the sprinkler systems.
(3) Each cable spreading room of each unit should have divisional cable separation, and be separated from each other and the rest of the plant by a minimum three-hour rated fire wall (refer to NFPA 251 or ASTM E-119 for fire test resistance rating.)	The Cable Vault and the Electrical Penetration Areas in the RAB are segregated from each other and all other plant areas by three-hour fire walls. In addition, alternative shutdown capability is provided which permits the plant to be taken to cold shutdown independent of equipment and cables in the Cable Vault.

(4) At least two remote and separate entrances are provided to the room for access by fire brigade personnel, and	At least two entrances are provided to facilitate fire response.
(5) Aisle separation provided between tray stacks should be at least three feet wide and eight feet high.	Due to the Cable Spreading Room configuration, the aisle size is limited by cable tray routing to less than the recommended dimensions of three foot width and eight foot height. Access aisles and clearance space to facilitate manual firefighting are marked.
(b) For cable spreading rooms that do not provide divisional cable separation of (a) (3), in addition to meeting (a)(1), (2), (4) and (5) above, the following should also be provided.	
(1) Divisional cable separation should meet the guidelines of Regulatory Guide 1.75, "Physical Independence of Electric Systems."	Cable tray routing and divisional separation meets Regulatory Guide 1.75 guidelines to the extent practicable.
(2) All cabling should be covered with a suitable fire retardant coating.	No firebreaks are provided in these cable areas because they are protected with dedicated sprinklers. Individual cables have a fire retardant jacket and satisfy the flame test requirement of IEEE 383-1974.
(3) As an alternative to (a)(1) above, automatically initiated gas systems (Halon or CO_2) may be used for primary fire suppression, provided a fixed water system is used as a backup.	
(4) Plants that cannot meet the guidelines of Regulatory Guide 1.75, in addition to meeting (a) (1), (2), (4), and (5) above, an auxiliary shutdown system with all cabling independent of the cable spreading room should be provided.	As described in the Safe Shutdown Analysis (see Subsection 9.5-1.4), alternative shutdown capability is provided which permits the plant to be taken to cold shutdown independent of equipment and cables in the Cable Vault.

4. Plant Computer Room

Safety-related computers should be separated from other areas of the plant by barriers having a minimum three-hour fire resistant rating. Automatic fire detection should be provided to alarm and annunciate in the Control Room and alarm locally. Manual hose station and portable water and Halon fire extinguishers should be provided.

The plant computer is not safety-related. The area housing the non-safety-related computer system is segregated from all adjoining areas by two and three-hour rated fire walls. Automatic fire detection is provided throughout the Computer Room and alarms and annunciates locally and in the Control Room. Hose stations and portable fire extinguishers are provided for manual fire control.

→ (DRN 99-1018)

5. Switchgear Rooms

Switchgear rooms should be separated from the remainder of the plant by minimum three-hour rated fire barriers, if practicable. Automatic fire detection should alarm and annunciate in the Control Room and alarm locally. Fire hose stations and portable extinguishers should be readily available.

← (DRN 99-1018)

The Switchgear Rooms 'A,' 'B,' and 'A/B' are isolated from other plant areas by three-hour fire walls. Switchgear Rooms are separated into zones 'A,' 'B,' and 'A/B' are separated from each other by approximately 12 foot high fire wall partitions, as the area configuration does not accommodate full height wall.

The fire walls are equipped with rated fire door assemblies and the openings are protected with spill retention curbs.

Two independent automatic preaction sprinkler systems are provided; one for Switchgear Room 'B' and one for Switchgear Rooms 'A' and 'AB'. The actuation for each of these systems is by the area ionization smoke detection systems. Water will not be discharged until sufficient heat has developed to fuse the sprinkler heads.

The Computer Battery Room is a separate room associated with the Switchgear Area Envelope fire area and is protected by an extension of the Switchgear Area 'A' detection system.

The CEA Drive M/G Sets and the H&V Fan Room are separate rooms associated with the Switchgear Area Envelope fire area. Each room has ionization area fire detection systems. Fire detectors in these areas alarm in the Control Room and at local detection control panels. Hose stations and portable fire extinguishers are provided for manual fire control.

→ (DRN 99-1018)

Acceptable protection for cables that pass through the switchgear room is automatic water or gas agent suppression. Such automatic suppression must consider preventing unacceptable damage to electrical equipment and possible necessary containment of agent following discharge.

The preaction suppression systems are provided to prevent inadvertent operation. Water damage has been considered and protection, such as sealing cable tray and conduit entries, is provided.

← (DRN 99-1018)

6. Remote Safety-Related Panels

The general area housing remote safety-related panels should be provided with automatic fire detectors that alarm locally and alarm and annunciate in the Control Room. Combustible materials should be controlled and limited to those required for operation. Portable extinguishers and manual hose stations should be provided.

The Auxiliary Control Panel Area is isolated from other areas by three-hour fire walls and is equipped with ionization smoke detectors which alarm both at the local detection control panel and in the Control Room. Combustible materials are limited in this area. Portable extinguishers and manual hose stations are available.

7. Station Battery Room

Battery rooms should be protected against fire explosions. Battery rooms should be separated from each other and other areas of the plant by barriers having a minimum fire rating of three-hour inclusive of all penetrations and openings. (See NFPA 69, "Standard on Explosion Prevention Systems.") Ventilation systems in the battery rooms should be capable of maintaining the hydrogen concentration well below 2 volume percent hydrogen concen- tration. Standpipe and hose and portable extinguishers should be provided.

Each Battery Room is surrounded by barriers having fire ratings of three hours. Openings are protected by Class A fire doors. The Battery Rooms ventilation systems are capable of maintaining H_2 concentrations at well below two volume percent as protection against fire explosions. Hose stations and portable extinguishers are available near the Battery Rooms.

Alternatives:

(a) Provide a total fire rated barrier enclosure of the battery room complex that exceeds the fire load contained in the room.

(b) Reduce the fire load to be within the fire barriere capability of 1-1/2 hours.

(c) Provide a remote manual actuated sprinkler system in each room and provide the 1-1/2 hour fire barrier separation.

8. Turbine Lubrication and Control Oil Storage and Use Areas

A blank fire wall having a minimum resistance rating of three hours should separate all areas containing safety-related systems and equipment from the turbine oil system.

The Turbine-Generator Lubricating Oil Equipment is separated from safety equipment and structures by major structural walls. Fire resistance rating of the walls are in excess of three hours. Access openings are protected by Class A doors. Oil use areas and equipment in the Turbine Building are protected by automatic sprinkler systems, hose stations, and portable fire extinguishers.

9. Diesel Generator Areas

Diesel generators should be separated from each other and other areas of the plant by fire barriers having a minimum fire resistance rating of three hours.

The Diesel Generator Areas are separated from each other and other plant areas by three-hour fire barriers. For an acceptable exception concerning a section of the south wall of the DG 'B' Area see the Fire Area-By-Fire Area Analysis, (Subsection 9.5.1.3.2).

→ (DRN 99-1018)

Automatic fire suppression such as AFFF foam, or sprinklers should be installed to combat any diesel generator or lubricating oil fires. Automatic fire detection should be provided to alarm and annunciate in the Control Room and alarm locally. Drainage for fire fighting water and means for local manual venting of smoke should be provided.

← (DRN 99-1018)

Separate automatic preaction sprinkler systems are installed in each Diesel Generator Area. Fire detection actuates the system and alarms both locally and in the Control Room. Drainage, separated from other plant drainage systems, provides for the removal of fire protection water. The once-through ventilation systems serving these areas are used for smoke venting.

→ (DRN 00-691)

Day tanks with total capacity up to 1,100 gallons are permitted in the diesel generator area under the following conditions:

(a) The day tank is located in a separate enclosure, with a minimum fire resistance rating of three hours, including doors or penetrations. These enclosures should be capable of containing the entire contents of the day tanks. The enclosure should be ventilated to avoid accumulation of oil fumes.

← (DRN 00-691)

(b) The enclosure should be protected by automatic fire suppression systems such as AFFF or sprinklers.

The Emergency Diesel Generator Fuel Oil Day Tanks for the Emergency Diesel Generators are of a 613-gallon capacity each and are segregated from other plant areas, the Diesel Generators and from each other by three-hour rated concrete walls, An automatic preaction sprinkler system protects the feed tanks. The tanks and associated oil piping are designed to seismic Category I, ASME Section III, assuring a high degree of system integrity and minimizing the chances of oil spills and, thus, of fires in the area. The areas are adequately ventilated and are also protected by hose stations and portable fire extinguishers.

10. Diesel Fuel Oil Storage Areas

Diesel fuel oil tanks with a capacity greater than 1,100 gallons should not be located inside the buildings containing safety related equipment. They should be located at least 50 feet from any building containing safety-related equipment, or if located within 50 feet, they should be housed in a separate building with construction having a minimum fire resis-tance rating of three hours. Buried tanks are considered as meeting the three-hour fire resistance requirements. See NFPA 30, "Flammable and Combustible Liquids Code," for additional guidance.	The Diesel Generator Fuel Oil Storage Tanks are located in separated enclosed vaults located on opposite sides of the Reactor Auxiliary Building. The enclosures have walls, floors, and ceilings with minimum fire ratings of three-hours. Access to these areas is provided by openings serviced by fixed ladders. These openings are required to provide natural ventilation for the Diesel Fuel Oil Storage Areas. This opening does not expose any safety-related equipment/component. Area ionization smoke detection systems are provided for the areas. The areas are protected by adequate hose stations and portable fire extinguishers.
When located in a separate building, the tank should be protected by an automatic fire suppression system such as AFFF or sprinklers.	The Diesel Generator Fuel Oil Storage Tanks are protected by automatic wet pipe sprinkler systems. The areas are additionally protected with ionization smoke detection systems and adequate hose station and portable fire extinguishers.
Tanks, unless buried, should not be located directly above or below safety-related systems or equipment regardless of the fire rating of separating floors or ceilings.	Safety-related equipment is not located directly above or below the diesel fuel oil storage tanks.

11. Safety-Related Pumps

→ (DRN 99-1018)

Pump houses and rooms housing safety-related pumps should be protected by automatic sprinkler protection unless a fire hazards analysis can demonstrate that a fire will not endanger other safety-related equipment required for safe plant shutdown. Early warning fire detection should be installed with alarm and annunciation locally and in the Control Room. Local hose stations and portable extinguishers should also be provided.	Essential pumps required for safe plant shutdown are segregated from each other and other plant areas. (Refer to Fire Area-By Fire Area Analysis.) Automatic pre-action sprinkler systems are installed in the Emergency Feedwater Pump, Charging Pump, Component Cooling Water Pump and the Chilled Water Pump areas except for emergency Feedwater Pump B and Component Cooling Water Pump B. Ionization smoke detection systems, hose stations and portable fire extinguishers are located throughout the areas. Fire detection systems alarm in the Control Room.

← (DRN 99-1018)

12. New Fuel Area

Hand portable extinguishers should be located within this area. Also, local hose stations should be located outside, but within hose reach of this area, automatic fire detection should alarm and annunciate in the Control Room and alarm locally. Combustibles should be limited to a minimum in the new fuel area. The storage area should be provided with a drainage system to preclude accumulation of water. The storage configuration of new fuel should always be so maintained as to preclude criticality for any water density and might occur during fire water application.	→(DRN 00-691) Fire retardant treated redwood flooring is provided in the new fuel storage pool. The entire new fuel pool arrangement is provided with a steel cover plate. Hose stations and portable fire extinguishers are located in the area of the New Fuel Vault. Ionization smoke detectors which alarm both locally and in the Control Room are located in the area. Location of the hose stations in the area is considered acceptable since the New Fuel Storage Racks are designed to maintain the fuel in a subcritical configuration even when flooded with unborated water. ←(DRN 00-691)

13. Spent Fuel Pool Area

Protection for the spent fuel pool area should be provided by local hose stations and portable extinguishers. Automatic fire detection should be provided to alarm and annunciate in the Control Room and to alarm locally.	Hose stations and portable fire extinguishers are provided in or near the Spent Fuel Area. Ionization smoke detectors which alarm both locally and in the Control Room are located in this area.

14. Radwaste Building

The Radwaste Building should be separated from other areas of the plant by fire barriers having at least three-hour ratings. Automatic sprinklers should be used in all areas where combustible materials are located. Automatic fire detection should be provided to annunciate and alarm in the Control Room and alarm locally. During a fire, the ventilation systems in these areas should be capable of being isolated. Water should drain to liquid radwaste building sumps.	→(DRN 00-691) The Radwaste Area is separated from other plant areas within the Reactor Auxiliary Building by three-hour fire barriers. A pre-action sprinkler system is installed to protect in all areas where combustible materials and redundant equipment required for safe shutdown are located. Drainage is to radwaste sumps. Ventilation systems are arranged for isolation features. ←(DRN 00-691)
→(DRN 00-691) Acceptable alternative fire protection is automatic fire detection to alarm and annunciate in the Control Room, in addition to manual hose stations and portable extinguishers consisting of handheld and large wheeled units. ←(DRN 00-691)	Ionization smoke detectors alarm locally and in the Control Room. Standpipe hose stations and portable extinguishers are provided.

15. Decontamination Areas

→ (DRN 99-1018)

The decontamination areas should be protected by automatic sprinklers if flammable liquids are stored. Automatic fire detection should be provided to annunciate and alarm in the Control Room and alarm locally. The ventilation system should be capable of being isolated. Local hose stations and hand portable extinguishers should be provided as backup to the sprinkler system.

Most decontamination areas are provided with automatic sprinkler systems, except for minor lavatory, shower, corridor and office areas. The decontamination areas are provided with ionization smoke detectors which alarm in the Control Room, standpipe hose stations, and portable fire extinguishers. Ventilation system isolation capability has been provided.

← (DRN 99-1018)

16. Safety-Related Water Tanks

Storage tanks that supply water for safe shutdown should be protected from the effects of fire. Local hose stations and portable extinguishers should be provided. Portable extinguishers should be located in nearby hose houses. Combustible materials should not be stored next to outdoor tanks. A minimum of 50 feet of separation should be provided between outdoor tanks and combustible materials where feasible.

The condensate storage pool and the refueling water storage pool are located in the Reactor Auxiliary Building. Areas containing these storage pools are provided with hose stations and portable fire extinguishers.

17. Cooling Towers

→ (DRN 99-1018)

Cooling towers should be of noncombustible construction or so located that a fire will not adversely affect any safety-systems or equipment. Cooling towers should be of noncombustible construction when the basins are used for the ultimates heat sing or for the fire protection water supply.

The ultimate heat sink Cooling Towers are both dry and wet types. Cooling Tower construction is non-combustible. Cooling Tower basins are not used for fire protection water supply. The redundant cooling Towers are separated from each other by spatial separation. The essential equipment is protected by fire detection systems alarming in the Control Room and by adequate hose stations and portable fire extinguishers.

← (DRN 99-1018)

→ (DRN 99-2227; 00-691)

18. Miscellaneous Areas

Miscellaneous areas such as records storage areas, shops warehouses, and auxiliary boiler rooms should be so located that a fire or effects of a fire, including smoke, will not adversely affect any safety-related systems or equipment. Fuel oil tanks for auxiliary boilers should be buried or provided with dikes to contain the entire tank contents.

Miscellaneous areas do not expose safety-related systems in the plant. The auxiliary boiler area, the Batch Oil Tanks and the Fuel Oil Storage Tank are located outdoors, segregated from all areas housing safety-related systems.

← (DRN 99-2227; 00-691)

G. Special Protection Guidelines

1. Welding and Cutting Acetylene Oxygen Fuel Gas Systems

This equipment is used in various areas throughout the plant. Storage locations should be chose to permit fire protection by automatic sprinkler systems. Local hose stations and portable equipment should be provided as backup. The requirements of NFPA 51 and 51B are applicable to these hazards. A permit system should be required to utilize this equipment. (Also refer to 2f herein).

→
The acetylene - oxygen system cylinders are stored in areas of the station separated from the nuclear plant island. These storage locations do not pose a hazard to any safety-related systems or equipment. Transient conditions for these cylinders are controlled as indicated in the Fire Protection Program. Adequade hose stations and fire extinguishers are available throughout the plant.
←

2. Storage Areas for Dry Ion Exchange Resins

Dry ion exchange resins should not be stored near essential safety-related systems. Dry unused resin should be protected by automatic pipe sprinkler installations. Detection by smoke and heat detectors should alarm and annunciate in the Control Room and alarm locally. Local hose stations and portable extingu- ishers should provide backup for these areas. Storage areas of dry resin should have curbs and drains. (Refer to NFPA 92M, "Waterproofing and Draining of Floors.")

Bulk Resin Storage is maintained in outside warehouses which do not house or expose areas housing safety-related systems.

3. Hazardous Chemicals

Hazardous chemicals should be stored and protected in accordance with the recommendations of NFPA 49, "Hazardous Chemicals Data." Chemicals storage areas should be well ventilated and protected against flooding conditions since some chemicals may react with water to produce ignition.

Bulk Chemical Storage is maintained in a protected area that does not house or expose areas housing safety-related systems. Portable fire extinguishers and hose lines are provided and arranged for compatibility with the chemicals stored. The areas are well ventilated and protected against flooding conditions.

4. Materials Containing Radioactivity

Materials that collect and con-tain radioactivity such as spent ion exchange resins, charcoal filters, and HEPA filters should be stored in closed metal tanks or containers that are located in areas free from ignition sources or combustibles. These materials should be protected from exposure to fires in adjacent areas as well. Consideration should be given to requirements for removal of isotopic decay heat from entrained radioactive materials.

Administrative procedures provide control of combustibles as indicated in the Fire Protection Program.

9.5.1.3.2 Fire Area-By-Fire Area Analysis

Fire areas are those portions of the station that are separated by boundary fire barriers. Fire zones are subdivisions of fire areas and are normally peripheral rooms associated with the latter, reflecting particular types of fire protection features.
➜
Table 9.5.1-3 provides a cross-reference of each fire area/zone to its physical location as illustrated on Drawing G210, Drawing G1356, Figures 9.5.1-3 through 9.5.1-13, Drawing G210, Drawing G1368 and Figures 9.5.1-15 through 9.5.1-21. Each fire area/zone is analyzed for fire hazards. This analysis is documented in this subsection and the following information is provided:
←

I. Identification of station fire area/zone including reference both to the applicable figure number and to the approximate bounding column lines.

II. Listing of equipment located in the fire area/zone which may be used to achieve and maintain safe shutdown following a fire elsewhere in the plant. Components that are not used for safe shutdown are also listed if their associated circuits affect safe shutdown when subject to a spurious signal. (Effects are analyzed in Item VI below.)

III. Identification of types of in situ combustibles and the anticipated duration of the potential fire in 15 minute increments. For specific details, refer to the Combustible Loading Calculations, document number FP-CLC-01.

IV. Listing of potential sources of radioactive materials during normal station operations.

V. Description of measures provided for fire control, including:

a) Area/zone boundary design and other containment features such as service penetrations and means of ingress and egress.

b) Detection system type and installation.

c) Primary and secondary fire suppression equipment and systems.

d) Smoke venting provision.

e) Drainage of fire suppression water.

VI. Analysis of the effects of in situ and transient combustible exposure fires on safe plant shutdown and on the control of radioactive releases to the environment with the assumption that all fire protection equipment, systems, and area/zone design features function as designed, and that automatic suppression systems fail to actuate.

VII. Identification of 10CFR50, Appendix R deviations including the bases for these deviations.

FIRE AREA-BY-FIRE AREA ANALYSIS

→(DRN 00-691, R11-A)

I. Description of Fire Area: RAB 1

←(DRN 00-691, R11-A)

a. Building REACTOR AUXILIARY Elev: +46.00 Ft. MSL

→(EC-5000081435, R301)

b. Space Name: CONTROL ROOM COMPLEX +35-00 Ft. MSL

←(EC-5000081435, R301)

c. Figure No.: 9.5.1-6 & 9.5.1-21 Approximate Coordinates: Cols, 7A-12A, G-L

d. Floor Area: 17,183 sq ft

e. Zones Within the Fire Area:

RAB 1A - Control Room Proper
RAB 1B - Control Room H&V Room

→(EC-5000081435, R301)

RAB 1C - Control Room Emergency, Living Quarters

←(EC-5000081435, R301)

RAB 1D - Computer Room
RAB 1E - Cable Vault

II. Essential Equipment Within the Fire Area:

See RAB 1A, 1B, 1C, 1D, and 1E

III. In situ Combustible Material Loadings: Consist of, but are not limited to, cable insulation and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

See RAB 1A, 1B, 1C, 1D, and 1E for fire zone fire durations.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

See RAB 1A, IB, 1C, 1D, and 1E

3. Ingress and Egress:

Adequate ingress and egress for this fire area are provided through fire doors leading to and from various fire areas and zones. See RAB 1A, 1B, 1C, 1D, and 1E.

b. Fire Detection System:

→(DRN 00-691, R11-A; 02-89, R11-A)

See RAB 1A, 1B, 1C, 1D, and 1E

←(DRN 00-691, R11-A; 02-89, R11-A)

→(DRN 00-691, R11-A; 02-89, R11-A)
←(DRN 00-691, R11-A; 02-89, R11-A)

RAB 1

c. Fire Protection System:

See RAB 1A, 1B, 1C, 1D, and 1E

d. Smoke Venting:

See RAB 1A, 1B, 1C, ID, and 1E

e. Drainage:

See RAB 1A 9 1B, 1C, 1D, and 1E

VI. Analysis of Effects and Postulated Fires:

See RAB 1A, 1B, 1C, 1D, and 1E

VII. Appendix R Deviations:

See RAB 1A, 1B, IC, 1D, and 1E

I. Description of Fire Zone: RAB 1A

a. Building: REACTOR AUXILIARY Elev: +46.00 Ft. MSL
b. Space Name: CONTROL ROOM PROPER
c. Figure No.: 9.5-1-6 Approximate Coordinates: Cols, 8A-10A, G-K
d. Floor Area: 4,623 sq ft
e. Subspaces Within the Fire Zone: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “B”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “B” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “B”
d.	Essential Electrical Support:	Train “B” (EDG)
e.	Essential Mechanical Support:	ECW Train “B”
		CCW Train “B” w/ “B” DCT
		ACCW Train “B” w/ “B” WCT
		HVC Train “B”
		HVR Train “B”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Zone Boundary Barriers:

→(EC-5000081435, R301; EC-15965, R306)

Fire zone boundary design ratings are 2 hour zone/zone and 3 hours for the complex perimeter. The boundary between zones 1A and 1E is not rated.

←(EC-5000081435, R301)

2. HVAC Penetrations through Boundary Barriers:

←(EC-15965, R306)

Duct Penetration Safety-Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Related
North Wall	R	94x42	No	X	
North Wall	S	120x36	No	X	
East Wall	R	24x10	Yes (FD-42)	X	
North Wall	R	94x42	No	X	
East Wall	SV	24x12	No		X
East Wall	SV	14x12	No		X
East Wall	E	6x4	No		X
South Wall	S	4Ox28	No	X	
South Wall	R	48x3O	No	X	
East Wall	S	4Ox4O	No	X	
→(EC-15965, R306)					
West Wall	S	40x40	Yes (FD-44, pinned open)	X	
←(EC-15965, R306)					
West Wall	T(2)	21x21	Yes (FD-40,43)	X	
North Wall	T	25x11	Yes (FD-41)	X	
East Wall	T	12x12	No		X

All piping and tray penetrations are sealed.

The pass through security window in the north end of the east wall, separating RAB 1A from RAB 1C, is protected by a 2-hour rated rollup fire door (RCD 100).

3. Ingress and Egress:

Ingress and egress for this fire zone are provided through six fire doors (D77, D80, D84, D91, D256 and D259) located on the east, north and west walls, connecting to fire zones RAB 1C and 1D. Fire doors D77, D84, D91 and D259 are provided with letters of equivalence. Fire doors D80 and D256 are provided with "B" labels.

b. Detection:

Ionization smoke detectors are provided below the suspended ceiling and in Main Control Panels CP1, 2, 3, 4, 6, 7, 8, 18, 35 and 36.

c. Fire Protection:

Primary:

Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→ (DRN 00-343)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this zone. Specific locations of hose stations are indicated on General Arrangement drawings.

← (DRN 00-343)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal.
Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by opening of doors and stairways leading to immediate adjacent areas which are provided with water removal capabilities.

VI. Analysis of Effects of Potential Fires:

In the Control Room Proper, in situ combustible materials include cable insulation and ordinary combustible materials. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this zone. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or ordinary combustible materials. The second type is a transient combustible exposure fire. Potential fire severity is minimized by the use of IEEE-383 cables and administrative controls to limit quantities of transient and in situ ordinary combustible materials.

RAB 1A

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to the Control Room Proper. Alternate shutdown - as required by 1OCFR50, Appendix R, is provided for this zone. By use of transfer and isolation switches, manual operation of selected equipment and monitoring and control from the auxiliary control panel, LCP-43, located at EL. +21 ft msl (RAB 9), the capability for safe plant shutdown, using "B" train equipment, is provided, and control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 1OCFR50, Appendix R, Section III.G.3 to install a fixed suppression system in the Control Room Proper (RAB 1A) has been granted.

b. The basis for this exception is as follows:
   1. Low combustible loading.

   2. Continuous manning of the Control Room.

   3. Ionization detectors provided.

   4. Auxiliary Control Panel (LCP-43) provides alternate shutdown capability.

RAB 1B

I. Description of Fire Zone:

a. Building: REACTOR AUXILIARY Elev: +46.00 Ft. MSL
b. Space Name: CONTROL ROOM H&V ROOM
c. Figure No.: 9.5.1-6 Approximate Coordinates: Cols, 8A-11A, K-L
d. Floor Area: 2,584.5 sq ft
e. Subspaces Within the Fire Zone: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “A” and “AB”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A” and “AB” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “A”
d.	Essential Electrical Support:	Train “A” (EDG & Offsite), Train “B” (Offsite) and Train “AB”
e.	Essential Mechanical Support:	ECW Train “A” CCW Train “A” w/ “A” DCT ACCW Train “A” w/ “A” WCT HVC “Portable” HVR Train “A”

←(DRN 03-993, R13)

→(DRN 99-1018, R11)
←(DRN 99-1018, R11)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and charcoal within filter enclosures. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Zone Boundary Barriers:

→(DRN 03-993, R13; EC-5000081435, R301)

Fire zone boundary design ratings are 2 hour zone/zone walls and 3 hours for the complex perimeter.

←(EC-5000081435, R301)

→(DRN 02-1761, R12-A)

All vertical cable trays are provided with firebreaks at approximately 15 foot intervals.

←(DRN 02-1761, R12-A; 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
South Wall	R	94x42	No	X	
South Wall	OAI	12x6	No	X	
South Wall	S	120x36	No	X	
South Wall	OAI	12x6	No	X	
South Wall	R	94x42	No	X	
South Wall	E	14x12	No		X
South Wall	E	14x12	No		X
East Wall	OAI	22x14	Yes (FD-36)	X	
East Wall	OAI	12x6	Yes (FD-37)	X	
North Wall	E	48x24	Yes (FD-38)	X	

All piping and tray penetrations are sealed.

→(DRN 99-1018, R11)

←(DRN 99-1018, R11)

3. Ingress and Egress:

Ingress and egress for this fire zone are provided through two fire doors. One door (D99) is provided with an "A" label. This door, located in the south wall, connects to the common corridor in fire zone RAB 1C. The other door (D85) is provided with a letter of equivalence. This door, located in the west wall, connects to fire area RAB 2, near the stairs at Column K-8A.

b. Detection:

→ (DRN 99-0971)

Ionization smoke detectors are provided for this fire zone. Charcoal filter enclosures are provided with temperature sensors as part of the decay heat monitoring system.

← (DRN 99-0971)

c. Fire Protection:

Primary:

A pre-action automatic sprinkler system is provided for this entire fire zone. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary

→ (DRN 00-343)

Hose stations installed in accordance with the guidelines of NFPA. 14 are available for use in this zone. Specific locations of hose stations are indicated on General Arrangement drawings.

← (DRN 00-343)

d. Smoke Venting:

Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to the waste tanks at EL. +35.00 ft msl. From there pumps discharge into the Waste Management System.

VI. Analysis of Effects of Potential Fires:

In the Control Room H&V Room, in situ combustible materials include charcoal within filter enclosures, and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

RAB 1B

Two types of fires have been postulated for this zone. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or charcoal. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic zone wide suppression, and a trained fire brigade.

→(DRN 03-993, R13)

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "B" train equipment and “A” train air handling equipment (AH-26). Safe plant shutdown can be accomplished by using "A" train components. Ventilation of the Control Room can be accomplished by opening doors and the use of portable equipment. In the event that manual ventilation of the Control Room is not adequate, safe plant shutdown can be accomplished using "A" train components that are monitored and controlled from the auxiliary control panel, LCP-43, located in fire area RAB 9.

←(DRN 03-993, R13)

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 to enclose essential redundant conduit in the same 1-hour wrap for Battery Room (A, A/B, and B) Ventilation Exhaust Systems in the Control Room H&V Room (RAB IB) has been granted.

→(DRN 03-993, R13)

During development of EC-F00-026, Post-Fire Safe Shutdown Analysis, it was determined that these fans were not required for Safe Shutdown. The fans are not credited in this area and the associated deviation is no longer required.

←(DRN 03-993, R13)

→(DRN 00-691, R11-A; 03-993, R13)

←(DRN 00-691, R11-A; 03-993, R13)

RAB 1B

→(DRN 03-993, R13)
←(DRN 03-993, R13)

I. Description of Fire Zone: RAB 1C

a. Building: REACTOR AUXILIARY Elev: +46-00 Ft- MSL
b. Space Name: CONTROL RM EMERG. LIVING QUARTERS
c. Figure No.: 9.5-1-6 Approximate Coordinates: Cols, 7A-12A, G-K
d. Floor Area: 2,936 sq ft
e. Subspaces Within the Fire Zone: None

→(DRN 03-993, R13)
II. Essential Equipment Credited for this Fire Zone/Area:

This area has no impact on Post-Fire Safe Shutdown.
←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Zone Boundary Barriers:
→(EC-5000081435, R301)
Fire zone boundary design ratings are 2 hour zone/zone walls and 3 hours for the complex perimeter. The boundary between zones 1C and 1E is not rated.
←(EC-5000081435, R301)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
East Wall	T(2)	21x21	Yes (FD-40,43)	X	
South Wall	R	94x42	No	X	
South Wall	S	12Ox36	No	X	
South Wall	T	25x11	Yes (FD-41)	X	
South Wall	R	94x42	No	X	
West Wall	SV	24x12	No		X
West Wall	T	24x10	Yes (FD-42)	X	
West Wall	SV	14x12	No	X	

RAB 1C

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
South Wall	Smoke Vent	14x12	No		X
North Wall	R	94x42	No	X	
North Wall	OAI(2)	12x6	No	X	
North Walls	S	12Ox36	No	X	
West Wall	OAI	12x6	Yes (FD-39)	X	
North Wall	R	94x42	No	X	
North Wall	E	14x12	No		X
North Wall	E	14x12	No		X
West Wall	S	4x6	No		X
→(EC-15965, R306)					
West Wall	T	12x12	No	X	
←(EC-15965, R306)					

All piping and tray penetrations are sealed.

The pass through security window in the north side of the west wall in the east corridor, separating RAB IC from RAB 1A, is protected by a 2-hour rollup fire door (RCD 100).

3. Ingress and Egress:

Ingress and egress for this fire zone are provided through eight fire doors. One door D261, located on the south wall, connects to the air lock. Two doors D99 and D71 located on the north wall, leads to RAB 1B and vestibule, respectively. Two doors D84 and D78, located on the south wall, also connect to RAB 1A and RAB 1D. Three doors D77, D80 and D256, located on the west wall, connect to RAB 1A. Two doors D259 and D75, located on the east wall, connect to RAB IA and RAB 3, respectively. Doors D99 and D261 are provided with "A" labels. Doors D71, D75, D77, D78, 84 and 259 are provided with letters of equivalence. Doors D80 and D256 are provided with "B" labels.

b. Detection:

Ionization smoke detectors are provided in the Emergency Living Quarters and the Control Room Kitchen and Water Closet.

c. Fire Protection:

Primary:

Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→ (DRN 00-343, R11, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this zone. Specific locations of these stations are

← (DRN 00-343, R11, R11)

indicated on General Arrangement drawings.

d. Smoke Venting:

The normal ventilation system may be used for smoke removal.
Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by openings of doors and stairways leading to immediate adjacent areas which are provided with water removal capabilities.

VI. Analysis of Effects of Potential Fires:

→(EC-5000081435, R301)

In the Control Room Emergency Living Quarters, in situ combustible materials include moderate quantities of ordinary combustible materials. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

←(EC-5000081435, R301)

Two types of fires have been postulated for this zone. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of ordinary combustible materials. The second type is a transient combustible exposure fire. Potential fire severity is minimized by administrative controls to limit quantities of transient and in situ ordinary combustible materials.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner. As there are no safe shutdown equipment located in this zone, an unmitigated fire would not affect safe shutdown of the plant and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted for this fire zone, specifically:

1. The need for total area wide coverage of smoke detection and automatic fixed suppression systems.

b. The absence of an automatic fixed suppression system and complete zone wide smoke detection for the Control Room Emergency Living Quarters (RAB 1C) is based upon the following:

1. No safe shutdown equipment in this zone.

2. Detection in adjacent living quarters would detect a postulated fire in the corridor space.

RAB 1C

3. Low combustible loading.

I. Description of Fire Zone: RAB 1D

→(DRN 03-993, R13)

a. Building: REACTOR AUXILIARY Elev: +46.00 Ft. MSL

←(DRN 03-993, R13)

b. Space Name: COMPUTER ROOM
c. Figure No.: 9.5.1-6 Approximate Coordinates: Cols, 1OA-11A, G-J
d. Floor Area: 1,261 sq ft
e. Subspaces Within the Fire Zone:

Area below raised floor

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone:

This area has no impact on Post-Fire Safe Shutdown.

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

→(EC-15965, R306)

In situ combustible materials consist of, but are not limited to, cable insulation and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

←(EC-15965, R306)

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Zone Boundary Barriers:

→(EC-5000081435, R301)

Fire zone boundary design ratings are 2 hour zone/zone walls and 3 hours for the complex perimeter.

←(EC-5000081435, R301)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
North Wall	S	40x28	No	X	
North Wall	R	48x30	No	X	
East Wall	S	46x18	Yes		X
East Wall	R	46x18	Yes		X
West Wall	S	40x40	No	X	
East Wall	S	38x38	Yes (FD-45)	X	
North Wall	Smoke/Vent	14x12	No	X	

→(EC-15965, R306)
←(EC-15965, R306)

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire zone are provided through three fire doors. One door (D91), located in the west wall connects to fire zone RAB IA, and the second door (D78), located in the. north wall connects to common corridor in fire zone RAB 1C. The third door (D81), located in the east wall connects the Computer Room with RAB 3. Door D81 is provided with an "A" label. Doors D78 and D91 are provided with letters of equivalence.

b. Detection:

Ionization smoke detectors are provided below the suspended ceiling and the raised floor.

c. Fire Protection:

Primary:

Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→ (DRN 00-343)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this zone. Specific locations of hose stations are indicated on General Arrangement drawings.

← (DRN 00-343)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

f. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by opening of doors and stairways leading to immediate adjacent areas which are provided with water removal capabilities.

VI. Analysis of Effects of Potential Fires:

In the Computer Room, in situ combustible materials include ordinary combustible materials and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

RAB 1D

Two types of fires have been postulated for this zone. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or ordinary combustible materials. The second type is a transient combustible exposure fire. Potential fire severity is minimized by administrative controls to limit quantities of transient and in situ ordinary combustible materials.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner. However, if an unmitigated fire is assumed, there will be no damage to safe shutdown equipment, as there are no safe shutdown components located in this zone. Thus, the capability of the plant for a safe shutdown and for control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted for this zone, specifically.

1. The need for total area wide coverage of smoke detection and automatic fixed suppression systems.

b. The absence of complete fixed suppression coverage for the Computer Room (RAB 1D) is based upon the following:

1. Plant computer not required for safe shutdown.

2. Low combustible loading.

→ RAB 2

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +46.00, +69.00 and +91.00 Ft. MSL
b. Space Name: H&V MECHANICAL ROOM
c. Figure No.: 9.5.1-6 Approximate Coordinates:
and 9.5.1-15 Cols, 1A-8A, J-M
d. Floor Area: 13,969 Sq ft
e. Zones Within the Fire Area: None

←

RAB 2

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “A” or “B” or “AB”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A” or “B” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “A” or “B”
d.	Essential Electrical Support:	Train “A” (Offsite), Train “B” (Offsite) and Train “AB”
e.	Essential Mechanical Support:	ECW Train ”A” or “B” or “AB” CCW Train “A” or “B” w/ “A” or “B” DCT ACCW Train “A” or “B” w/ “A” or “B” WCT HVC Train “B” HVR Train “A” or “B” or “AB”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and charcoal within filter enclosures. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials: Charcoal filter trains

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

Exterior walls at EL. +46.00 ft msl are 3-hour rated due to exposures from emergency diesel oil feed tanks and maintenance lube oil storage tanks. Exterior walls at EL. +69-00 and +91.00 ft msl. require no fire rating since no exposures exist.

Construction at these elevations is reinforced concrete with nonrated louvers, doors, penetrations, etc.

→(DRN 03-993, R13)

All vertical cable trays are provided with firebreaks at approximately 15 foot intervals. Selected essential (Safe Shutdown) raceways are provided with one-hour fire rated barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis. "AB" train chilled water components are separated from redundant "A" and "B" train components by a partial height one-hour fire rated wall.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
South Wall	OAI(2)	96x48	No	X	
Ceiling	OAI	120x36	No	X	
Ceiling	OAI	12x6	No	X	
Floor	E	72x72	Yes (FD-76)	X	
→(EC-15965, R306)					
Floor	E	120x48	Yes (FD-174)		X
Floor	E	72x72	Yes (FD-77)	X	
East Wall	OIA	12x6	Yes (FD-39)	X	
North Wall	R(2)	30 D	No	X	
North Wall	E	8 D	No	X	
North Wall	E	84x84	No		X
North Wall	S(2)	30 D	No	X	
North Wall	E	6 D	No		X
North Wall	E	8 D	No	X	
North Wall	S	8 D	No	X	
North Wall	E	64x48	No		X
North Wall	S	14x14	No		X
North Wall	S	14x14	No		X
North Wall	S	8 D	No	X	
Floor	E	18XI8	Yes (FD-162)	X	
Ceiling	Stack	84 D	No	X	
Floor	E	18 D	Yes (FD-49)	X	
East Wall	E	6 D	Yes (FD-50)	X	
Floor	E	42 D	Yes (FD-175)		X
Floor	E	18x8	Yes (FD-34)	X	
Ceiling	S	84x84	No		X
Floor	S	72x48	Yes (FD-176)		X
←(EC-15965, R306)					
Floor	R	12x6	Yes (FD-32)	X	
Floor	R	12x6	Yes (FD-33)	X	
Ceiling	E	54x6O	No	X	
Floor*	E	30 D	No	X	
Ceiling* E	30 D	No	X		
Floor*	E	30 D	No	X	
Ceiling*	E	30 D	No	X	
Floor	E	18x14	Yes (FD-35)	X	
South Wall	OAI(2)	96x96	No	X	
Ceiling	R	180x60	No	X	
South Wall	OAI(2)	96x96	No		X
West Wall	OAI	96x72	No		X
North Wall	E	48x72	No		X
North Wall	E	72x72	No		X
East Wall	E	36x24	No**		X

*Diesel Exhaust Pipe
**See CI 305849

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area at EL. +46.00 ft msl are provided through fire door (D85) located on the east wall connecting to fire zone RAB IB, two doors (D265 and D97) located on the west wall at Columns J-3A and M-5A leading to roof area and two fire doors (D87 and D98) leading to stairways at Columns K-8A and L-9A. Ingress and egress at EL. +69.00 ft msl is provided through a door located on the east wall and two doors located on the west and north walls of the roof exhaust penthouses connecting to the open roof which leads to stairs across the roof at Column J-7A. Ingress and egress at EL. +91.00 ft msl is provided through an access door located on the north wall leading to the roof area via a ladder. Doors D97 and D265 are exterior doors whose primary function is other than fire resistance. Door D85 is provided with a letter of equivalence. Doors D87 and D98 are provided with "B" labels.

b. Detection:

→ (DRN 99-0971)

Ionization smoke detectors are provided in areas of significant combustible loadings. Charcoal filter enclosures are provided with temperature sensors as part of the decay heat monitoring system.

← (DRN 99-0971)

c. Fire Protection

Primary

→ (DRN 99-0971)

A partial pre-action automatic sprinkler system is provided for this fire area. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangements drawings. A manually activated water spray system is provided over charcoal beds in filter units E-17 (3A-SA), E-17 (3B-SB), E-23 (3A-SA), E-23 (3B-SB), and E-22.

← (DRN 99-0971)

→ (DRN 99-1018)

← (DRN 99-1018)

Secondary:

→ (DRN 00-343)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

← (DRN 00-343)

RAB 2

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to the waste tanks at EL. -35.00 ft msl.

VI. Analysis of Effects of Potential Fires:

In the H&V Mechanical Room, in situ combustible materials include charcoal within filter enclosures, and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or charcoal. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations, and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic suppression, manual deluge suppression for internal charcoal filter units, and a trained fire brigade.

→(DRN 03-993, R13)

Based on the foregoing discussion, it is expected that any fire would be (detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, damage would be limited such that at least one train of essential chillers and one area exhaust fan would remain available. The capability for safe plant shutdown and control of radioactive releases to the environment is maintained.

←(DRN 03-993, R13)

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The need for total area wide coverage of smoke detection and automatic

fixed suppression systems.

2. The need for a complete 1-hour barrier between redundant safe shutdown equipment.

3. The existence of 1-1/2 hour fire dampers in the fire area boundaries.

4. The enclosure of redundant cable tray and conduit in the same 1-hour rated fire wrap.

5. Protection of a steel maintenance hatch to a fire resistance equivalent to the floor boundary it forms a part of.

b. The basis for these exceptions is as follows:

1. Absence of detection and automatic fixed suppression for:

- Plant Stack and Rad Monitor Equipment Room - EL. +46.00 ft. between column lines L, M,5A, and 9A-

- SBVS Filter Laydown Area - EL. +46.00 ft, between column lines J, H, 3A, and SA.

- Roof Exhaust Penthouses - EL. +69.00 ft, between column lines 3A, 2A, J & K and 5A, 6A, J & K.

- EL. +91.00 ft.

→(LBDCR 14-020, R308)

a) These areas can be characterized as having low combustible loadings. If all of the combustibles in individual locations were totally consumed, a fire of less than 30-min. severity would result as determined by ASTM E-119 time-temperature curve. Total room burnout is not expected because the combustibles are widely dispersed throughout the area.

←(LBDCR 14-020, R308)

b) Fire detection systems are located in adjoining areas.

c) These locations contain either no safe-shutdown related equipment or the equipment consists of metal tanks, piping, and other systems that are noncombustible and are not likely to be damaged by a fire. Therefore, if a fire were to occur in these areas, no loss of safe shutdown capability would occur.

→(DRN 03-993, R13)

2. Part height 1-hour walls constructed between redundant water chillers, and chilled water pumps:

←(DRN 03-993, R13)

→(EC-18551, R304)

a) Automatic detection and suppression provided over all redundant safe shutdown equipment in the area.

b) Walls constitute a complete 1-hour separation (including penetrations) up to the height of the wall.

c) Low fire load in the fire area.

d) Administrative controls and low traffic volume limit the introduction of significant amounts of combustible materials.

e) Portable fire extinguishers and inside standpipe hose connections are provided for use by the trained fire brigade for manual fire fighting.

f) One train of redundant cabling is enclosed in a 1-hour fire rated wrap.

g) Construction and location of the partial-height fire barrier provides adequate protection from the radiative effects of a fire postulated on either side. The area containing the partial-height barrier is a large volume room with ceiling heights approximately 22 feet and construction is reinforced concrete. Therefore, a hot gas layer forming in the ceiling is not creditable based on type construction and large volume area. These attributes (construction and location of partial-height fire barrier, building construction and large volume area, automatic suppression, & enclosure of one train of redundant cabling in a 1-hour fire rated wrap) are considered adequate for combustible fire loads up to 1-hour which is considered a low fire loading. This ensures that a fire on either side of the partial-height barrier will not damage redundant safe shutdown components on the other side.

→(DRN 03-993, R13)

←(DRN 03-993, R13; EC-18551, R304)

3. Existence of 1-1/2 hour fire dampers in the fire area boundaries i.e., FD-49, FD-50 and the fire damper located in the 42 inch diameter floor duct.

a) Detection and suppression exist on both sides of each damper.

b) Fire severity of areas adjacent to each damper are less than fire rating of the subject damper.

4. Enclosure of essential redundant cable tray and conduit in the same 1-hour wrap for the Chilled Water System:

a) Regulatory Guide 1.75 separation criteria provides reasonable assurance that an internal tray or conduit fire will not propagate to a redundant tray or conduit.

1) This separation between one cable tray and a redundant cable tray or conduit within the same fire wrap is accomplished by providing the subject cable tray with either a metal tray cover or a 1/2-inch blanket cover (i.e., 30-minute fire rating). Where access and spatial separation between cable trays allow, 1-1/2 inch blanket tray cover (i.e., 1-hour fire rating) is preferred over a 1/2 inch blanket.

b) One-hour wrap provides sufficient protection to redundant cabling until actuation of automatic suppression system or arrival of fire brigade.

5. Lack of equivalent fire resistance on floor boundary side of steel equipment hatch between fire areas RAB 2 and RAB 23 located along column line J between column lines 4A and 5A:

a) A 3-hour fire protective coating protects the RAB 23 (ceiling) side of the equipment hatch.

b) Probability of a flammable liquid spill in vicinity of hatch is lessened due to administrative controls and low traffic levels through this area.

c) There are no credible sources of ignition in this hatch space.

d) The design of the hatch is such that only minor seepage of a liquid past the hatch to floor fitting can occur and thus act as a flame arrester.

e) Smoke detection and automatic fixed suppression coverage below the hatch provide adequate compensation for any fire hazard associated with seepage by the hatch fitting.

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +35.00 and +46.00 Ft. MSL
b. Space Name: HVAC EQUIP ROOM &
CORRIDOR & VESTIBULE
➜ c. Figure No.: 9.5.1-6 and 9.5.1-21 Approximate Coordinates:
Cols, 11A-12A, G-K
← d. Floor Area: 2,985 sq ft
e. Zones Within the Fire Area: None

RAB 3

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump "A" and "AB"

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump "A" and "B" w/ S/G 1 and 2

←(EC-19062, R306)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump "B"

d. Essential Electrical Support: Train "A" (EDG & Offsite), Train "B" (Offsite) and Train "AB"

e. Essential Mechanical Support: ECW Train "A" (Supplied by Chiller "AB") and "B"
CCW Train "A" and "B" w/ "A" and "B" DCT
ACCW Train "A" and "B" w/ "A" and "B" WCT
HVC Train "A"
HVR Train "A" or "B" (depending on effect of fire in RAB 3)

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

→(DRN 03-993, R13)

All vertical cable trays are provided with firebreaks at approximately 15 foot intervals. Selected essential (Safe Shutdown) raceways are provided with one-hour fire rated barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis. Air handling units, AH-25 (SA and SB), are isolated by a one-hour fire rated partial height wall with a one-hour rated fire door.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
Penetrations at EL. +46.00 ft msl:					
East Wall	OAI	96x60	No	X	
East Wall	E	48x24	No	X	
West Wall	S	38x38	Yes (FD-45)	X	
→(EC-15965, R306)					
West Wall	R	46x18	Yes (FD-172)		X
←(EC-15965, R306)					

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
→(EC-15965, R306)					
West Wall	S	46x18	Yes (FD-173)		X
←(EC-15965, R306)					
Penetrations at EL. +35.00 ft msl.		RAB 3			
West Wall	R	18x18	Yes (FD-58)	X	
West Wall	S	20x12	Yes (FD-61)	X	
West Wall	R	22x12	Yes (FD-51)	X	
West Wall	S	12x12	Yes (FD-53)	X	
West Wall	T	12x12	Yes (FD-75)	X	
Floor	S	30x24	Yes (FD-59)	X	
Floor	R	80x24	Yes (FD-60)	X	
Floor	S	18x20	Yes (FD-52)	X	
→(EC-15965, R306)					
Floor	E	10x10	Yes (FD-54)	X	
←(EC-15965, R306)					

Piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area at EL. +46.00 ft msl are provided through three fire doors. One door (D72), located in the north wall connects to the vestibule and stairs at Column K-12A, and two doors (D75 and D81), located in the west wall connects to fire zones RAB IC and RAB ID, respectively. Ingress and egress at EL. +35.00 ft msl are provided through one fire door (DI76) leading to stairwell at Column L-12A and three fire doors (DI74, D218 and D219) located on the west and the north walls connecting to fire areas RAB 5, RAB 7B, and RAB 7A- There is also a door (D228) located on the south side of the corridor connecting to EL. +40.00 ft msl of the Turbine Building. Doors D72 and D81 are provided with "A" labels. Door D176 is provided with a "B" label. Doors D75, D174, D218 and D219 are provided letters of equivalence. Door D228 is an exterior door whose primary function is other than fire resistance.

b. Detection:

Ionization smoke detectors are provided at EL. +46.00 ft msl and EL. +35.00 ft msl.

c. Fire Protection:

Primary:

→(DRN 99-1018, R11)

A pre-action automatic sprinkler system is provided for EL. +46.00 ft msl and EL. +35.00 ft msl. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific sizes and locations of portable fire extinguishers are indicated on General Arrangement drawings.

←(DRN 99-1018, R11)

Secondary:

→ (DRN 00-343)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

← (DRN 00-343)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to the sanitary drainage system.

VI. Analysis of Effects of Potential Fires:

In the HVAC Equipment Room and Corridor and Vestibule, in situ combustible materials include ordinary combustible materials and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or ordinary combustible materials. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls to limit quantities of transient and in situ ordinary combustible materials.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, damage would be limited to AH-30 (3A-SA) and AH-25 (3A-SA). Safe plant shutdown can be accomplished by using "B" train equipment and the "B" train switchgear area air handling unit. The continual control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The need for a complete 1-hour barrier between redundant safe shutdown equipment.

2. The need for total area wide coverage of smoke detection and automatic fixed suppression systems.

b. The basis for these exceptions is as follows:

1. Part height 1-hour wall constructed between redundant air handling units AH-25 (SA and SB).

→(EC-18551, R304)

a) Automatic detection and suppression provided over all redundant safe shutdown equipment in the area.

b) Walls constitute a complete 1-hour separation (including doors and penetrations) up to the height of the wall.

c) Low fire load in the fire area.

d) Administrative controls and low traffic volume limit the introduction of significant amounts of combustible materials.

e) Portable fire extinguishers and inside standpipe hose connections are provided for use by the trained fire brigade for manual fire fighting.

f) One train of redundant cabling is enclosed in a 1-hour fire rated wrap.

g) Construction and location of the partial-height fire barrier provides adequate protection from the radiative effects of a fire postulated on either side. The area containing the partial-height barrier is a large volume room with ceiling heights approximately 22 feet and construction is reinforced concrete. Therefore, a hot gas layer forming in the ceiling is not creditable based on type construction and large volume area. These attributes (construction and location of partial-height fire barrier, building construction and large volume area, automatic suppression, & enclosure of one train of redundant cabling in a 1-hour fire rated wrap) are considered adequate for combustible fire loads up to 1-hour which is considered a low fire loading. This ensures that a fire on either side of the partial-height barrier will not damage redundant safe shutdown components on the other side.

←(EC-18551, R304)

2. Absence of smoke detection and automatic fixed suppression at the +35.00 EL. H&V duct space located between column lines G and K along column line 12A;

a) Exposed cable is protected by 1-hour wrap. Conduits are separated by approximately 32'-O" with negligible and discontinuous intervening combustibles.

b) Low fire load.

c) Normally inaccessible.

d) Smoke detection and suppression of adjoining spaces will ensure that any postulated fire in this area will be detected in a timely manner and that its propagation will be checked until arrival of the fire brigade.

3. Absence of smoke detection and automatic fixed suppression for the room housing AH-31.

a) No essential safe shutdown equipment in this area.

b) Negligible fire load.

c) Ionization smoke detectors and automatic suppression in the balance of the RAB 3 area.

RAB 3A

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: -4.00, +7.00,
b. Space Name: H&V ROOM, ELEVATOR MACHINE ROOM +21.00, +35-00, +46.00 & ELEVATOR SHAFT and +69.00 Ft- MSL
c. Figure No.: 9.5.1-4, 9.5.1-5, 9.5-1-6, 9.5.1-10, and 9.5-1-21 Approximate Coordinates: Cols, 11A-12A, K-L
d. Floor Area: 527 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13; EC-23997, R305

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump "A", "B" and "AB"
b. Decay Heat Removal, Hot Shutdown: EFW Pump "A" and "AB" w/ S/G 1 and 2
c. Decay Heat Removal, Cold Shutdown: LPSI Pump "A"
d. Essential Electrical Support: Train "A", Train "B" and Train "AB"
e. Essential Mechanical Support: ECW Train "A" and "B"
CCW Train "A" (including "AB" CCW Pump) w/ "A" DCT
CCW Train "B" (including "AB" CCW Pump) w/ "B" DCT
ACCW Train "A" and "B" w/ "A" and "B" WCT
HVC Train "A" and "B"
HVR Train "A", "B" and "AB"

←(DRN 03-993, R13; EC-23997, R305)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, negligible amounts of permanent combustibles. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

→(DRN 03-993, R13)

Selected essential (Safe Shutdown) raceways are provided with one-hour fire rated barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

RAB 3A

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
North Wall (EL. +69.00)	OAI	96x48	No		X
South Wall (EL. +69.00)	OAI	36x18	No		X
→(EC-15965, R306)					
West Wall (EL. +69.00)	E	30x24	No		X
←(EC-15965, R306)					
West Wall (EL. +69.00)	OAI	36x36	No		X
West Wall (EL. +46.00)	OAI	24x14	Yes(FD-36)	X	
West Wall (EL. +46.00)	OAI	12xl6	Yes(FD-37)	X	
West Wall (EL. +35.00)	E	8x8	Yes(FD-55)	X	
West Wall (EL. +35.00)	E	8x8	Yes(FD-56)	X	
West Wall (EL. +35.00)	E	8x8	Yes(FD-57)	X	
→(EC-15965, R306)					
West Wall (EL. +21.00)	S	24x16	No (Exemption)	X	
South Wall (EL. +21.00)	S	24x16	No (Exemption)	X	
West Wall (EL. +7.00)	OAI	52x1O	Yes(FD-124)		X
West Wall (EL. +7.00)	S	22x24	Yes(FD-123)		X
West Wall (EL. +7.00)	E	14x16	Yes(FD-125)		X
Floor (EL. +7.00)	S	12x44	Yes(FD-186)		X
West Wall (EL. +7.00)	OAI	48x2O	Yes(FD-122)		X
←(EC-15965, R306)					

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area is provided through a fire door (Dl86) located on the east wall, EL. +69.00 ft msl, connecting to the stairwell at Column L-12A. Fire area RAB 3A also includes the entire length of the enclosed elevator shaft and H&V duct shaft. The elevator shaft is provided with standard elevator doors leading to the respective vestibules at each floor elevation serviced (EL. -4.00, +7.00, +21.00, +35.00 and +46.00 ft msl). Door D186 is provided with an "A" label. Door AD110 is located on the west wall, connects to RAB 27 at 4 EL. +7.00 ft msl, and is provided with an "A" label.

→(EC-15965, R306)

The vestibules on the +21.00 and +46.00 elevations are also part of this fire area. One the +46.00 elevation Fire Door D71 is provided on the south wall to the Control Room (RAB1C), Fire Door D70 is provided on the north wall to stairwell #4 and Fire Door D72 is provided on the south wall to fire area RAB3. One the +21.00 elevation Fire Door D10 is provided on the north wall to stairwell #4, Fire Door D11 is provided on the south wall to Fire Area RAB8C and Access Door D49 is provided on the south wall to exit the building via a non-fire rated exterior wall.

←(EC-15965, R306)

b. Detection:

Ionization smoke detectors are located above EL. +69.00 ft msl.

c. Fire Protection:

Primary:

A pre-action automatic sprinkler system is provided for this fire area at EL. +69.00 ft msl. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific sizes and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→ (DRN 00-343)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations, including all subject elevations, are indicated on General Arrangement drawings.

← (DRN 00-343)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage to the waste management system at EL. -35.00 ft msl is provided.

VI. Analysis of Effects of Potential Fires:

In the H&V Room, Elevator Machine Room and Elevator Shaft, in situ combustible materials include only negligible amounts of ordinary combustibles. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

A transient combustible exposure fire has been postulated for this fire area. An in situ combustible exposure fire is not considered for this area as only negligible amounts of combustibles are present. Potential fire severity is minimized by administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to the "A" and "B" train Exhaust Fans and temperature elements. These fans provide exhaust for the battery rooms. Ventilation of the battery rooms can be accomplished by opening access doors and by the use of portable equipment. Therefore, the capability of safe plant shutdown and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 1OCFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The need for a complete 1-hour barrier or 20 feet free of intervening combustibles between redundant safe shutdown equipment.

2. The need for total area wide coverage of smoke detection and automatic fixed suppression systems.

3. The need for the block wall-to-slab seal assemblies to have a documented hourly fire rating.

b. The basis for these exceptions is as follows:

1. Lack of separation between redundant exhaust fans E-29 (A&B), E-30 (A&B) and E-31 (A&B) by either a 1-hour barrier or 20 feet free of intervening combustibles.

   a) These fans provide exhaust for the battery rooms.
   Ventilation of the battery rooms is not adversely affected by loss of these exhaust fans. Procedures exist to effect ventilation of these rooms. Portable equipment to augment exhaust through access doors is available.

2. Absence of smoke detection and automatic fixed suppression coverage for the HVAC duct space and elevator shaft forming part of RAB 3A:

   a) The spaces open into the floor of RAB 3A at EL. +69.00 ft. They contain no safe shutdown equipment except HVAC ducting whose penetrations into the shaft are sealed and provided with fire dampers equivalent to the barrier rating.

   b) The shafts are separated from each other (except at the top) and from the adjoining stairwell and vestibule by a 2-hour rated fire boundary. Where they adjoin other fire areas, a 3-hour rated fire boundary exists.

   c) The accumulation of transient combustibles in these shafts is not credible.

   d) Smoke detection in the HVAC room at the top of the open shafts would provide prompt detection.

3. Lack of a documented hourly fire rating based on ASTM E-119 for Elevator Shaft B/Stairwell Enclosure 4.

   a) Gap sealed walls have sprinklers and smoke detectors on one side of the perimeter enclosure walls. Where no sprinklers or detectors exist on either side of perimeter enclosure walls, the adjacent vestibule has negligible combustibles and is enclosed by fire-rated walls.

   b) The interior of the elevator shaft/stairwell enclosure has a low combustible load.

RAB 1E

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +35.00 Ft- MSL
b. Space Name: CABLE VAULT
c. Figure No.: 9.5.1-21 Approximate Coordinates: Cols, 8A-11A, G-K
d. Floor Area: 5,778.5 sq ft
e. Subspaces Within the Fire Zone: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump "B"
b. Decay Heat Removal, Hot Shutdown: EFW Pump "B" w/ S/G 1&2
c. Decay Heat Removal, Cold Shutdown: LPSI Pump "B"
d. Essential Electrical Support: Train "B"
e. Essential Mechanical Support: ECW Train "B"
CCW Train "B" w/ "B" DCT
ACCW Train "B" w/ "B" WCT
HVC Train "B"
HVR Train "B"

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

→(DRN 03-993, R13)

In situ combustible materials consist of, but are not limited to, cable insulation in cable trays. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

←(DRN 03-993, R13)

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
→(EC-15965, R306)					
East Wall +46	S	40x40	Pinned Open (FD-44)	X	
North Wall	R	16x12	Yes (FD-65)	X	
North Wall	E	36x24	Yes (FD-169)		X
←(EC-15965, R306)					
North Wall	S	26x28	Yes (FD-71)	X	
Floor	S	20x26	Yes (FD-72)	X	
West Wall	S	16x8	Yes (FD-73)	X	
Floor	E	8x8	Yes (FD-68)	X	
Floor	E	8x8	Yes (FD-69)	X	
Floor	E	8x8	Yes (FD-70)	X	
Duct		Duct			

Penetration Location	Function	Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
North Wall	E	8x8	Yes (FD-62)	X	
North Wall	E	8x8	Yes (FD-63)	X	
North Wall	E	8x8	Yes (FD-64)	X	

All piping and tray penetrations are sealed.

RAB 1E

3. Ingress and Egress:

Ingress and egress for this fire zone are provided through four fire doors. Two fire doors (Dl92 and AD129) are located on the west wall leading to fire areas RAB 6 and RAB 23 (EL. 23.00 ft), and the other two fire doors (Dl78 and D175) are located in the north and east walls leading to fire areas RAB 5 and RAB 7A, respectively. Door AD129 is provided with an "A" label and doors D175, D178 and D192 are provided with letters of equivalence.

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

A pre-action automatic sprinkler system is provided for this entire fire area including individual cable tray protection. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→(DRN 00-343, R11; 03-993, R13)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this zone. Specific locations are indicated on General Arrangement drawings.

←(DRN 00-343, R11; 03-993, R13)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal.
Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by gravity floor drains to the yard storm water system.

VI. Analysis of Effects of Potential Fires:

In the Cable Vault, in situ combustible materials include cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

RAB 1E

Two types of fires have been postulated for this zone. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of cable insulation. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic zone wide suppression and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to the Cable Vault. Alternate shutdown, as required by Appendix R, is provided for this zone. By use of transfer and isolation switches, manual operation of selected equipment and monitoring and control from the auxiliary control panel, LCP-43, located at EL. +21.00 ft msl (RAB 9), the capability for safe plant shutdown using "B" train equipment is provided, and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from: the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The need for the block wall-to-slab seal assemblies to have a documented hourly fire rating.

b. The basis for this exception is as follows:

1. The balance of gap sealed walls on this elevation have sprinklers and detection on both sides.

RAB 5

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +35.00 Ft- MSL
b. Space Name: ELECTRICAL PENETRATION AREA 'B'
c. Figure No.: 9.5.1-21 Approximate Coordinates: Cols, 9A-11A, K-P
d. Floor Area: 5,406 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area:

a. RCS Inventory and Pressure Control: Charging Pump “A”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “A” w/ S/G 1 and 2

←(EC-19062, R306)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump “A”
d. Essential Electrical Support: Train “A” (EDG & Offsite) and 480V “AB”
e. Essential Mechanical Support: ECW Train “A”
CCW Train “A” w/ “A” DCT
ACCW Train “A” w/ “A” WCT

←(DRN 03-993, R13)

RAB 5

HVC Train "A"
HVR Train "A"

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

→(DRN 03-993, R13)

Selected essential (Safe Shutdown) raceways are provided with one-hour fire rated barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety - Related	Non-Safety-Related
→(EC-15965, R306)					
East Wall	E	18x18	Yes (FD-216A)		X
←(EC-15965, R306)					
East Wall	E	8x8	Yes (FD-55)	X	
East Wall	E	8x8	Yes (FD-56)	X	
East Wall	R	18x18	Yes (FD-58)	X	
West Wall	E	24x36	Yes (FD-171)		X
West Wall	R	36x8	Yes (FD-67)	X	
South Wall	S	26x28	Yes (FD-71)	X	
→(EC-15965, R306)					
South Wall	S	36x24	Yes (FD-169)		X
←(EC-15965, R306)					
South Wall	R	16x12	Yes (FD-65)	X	
South Wall	E	8x8	Yes (FD-62)	X	
South Wall	E	8x8	Yes (FD-63)	X	
South Wall	E	8x8	Yes (FD-64)	X	
→(EC-15965, R306)					
South Wall	E	36x24	Yes (FD-170)		X
←(EC-15965, R306)					
East Wall	E	8x8	Yes (FD-57)	X	

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area are provided through three fire doors (Dl79, D178 and D174) located on the west, south and east walls connecting fire areas RAB 6, RAB 3, zone 1E and an 4 enclosed stairway with a fire door (Dl28) at Column L-9A connecting to fire area RAB 2 at EL. +46.00 ft msl and fire zone RAB 8B at EL. +21.00 ft msl. Doors D128, D174, D178, and D179 are provided with letters of equivalence.

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

A pre-action automatic sprinkler system is provided for this entire fire area including individual cable tray protection. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→ (DRN 00-343)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations are indicated on General Arrangement drawings.

← (DRN 00-343)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal.
Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by gravity floor drains to the yard storm water system.

VI. Analysis of Effects of Potential Fires:

In the Electrical Penetration Area 'B,' in situ combustible materials include substantial amounts of cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of cable insulation. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier

penetrations; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic area wide suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "B" and "AB" equipment. Safe plant shutdown can be accomplished by using "A" train safe shutdown components and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 1OCFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The need for the block wall-to-slab seal assemblies to have a documented hourly fire rating.

b. The basis for this exception is as follows:

1. The gap sealed walls of the stairwell enclosure have sprinklers and smoke detectors on one side of the walls.

→(LBDCR 14-020, R308)

2. The interior of the stairwell enclosure contains negligible combustibles.

←(LBDCR 14-020, R308)

3. The balance of gap sealed walls on this elevation (EL. +35.00 ft) have sprinklers and detection on both sides.

RAB 6

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY
b. Space Name: ELECTRICAL PENETRATION AREA "A" Elev: +35.00 Ft. MSL
c. Figure No.: 9.5.1-21 Approximate Coordinates: Cols, 4A-9A, J-N
d. Floor Area: 3,624 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “B”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “AB” & “B” w/ S/G 1 and 2

←(EC-19062, R306)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump “B”
d. Essential Electrical Support: Train “B” (Offsite)
e. Essential Mechanical Support: ECW Train “B”
CCW Train “B” w/ “B” DCT
ACCW Train “B” w/ “B” DCT
HVC Train “B”
HVR Train “B”

←(DRN 03-993, R13)

RAB 6

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

→(DRN 03-993, R13)

Selected essential (Safe Shutdown) raceways are provided with one-hour fire rated barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
East Wall	S	16x8	Yes (FD-73)	X	
East Wall	R	36x8	Yes (FD-67)	X	
East Wall	E	24x36	Yes (FD-171)		X
West Wall	E	6 D	Yes (FD-47A)	X	
Floor	E	14 D	Yes (FD-46)	X	
Ceiling	E	18X18	Yes (FD-162)		X
Ceiling	E	18x8	Yes (FD-34)	X	
East Wall	E	6 D	Yes (FD-50)	X	
Ceiling	E	42 D	Yes (FD-175)		X
Floor	E	42 D	Yes (FD-168)		X
South Wall	E	12 D	Yes (FD-48A)	X	
Floor	E	18 D	Yes (FD-49)		X

→(EC-15965, R306)

←(EC-15965, R306)

All piping and tray penetrations are sealed.

3. Ingress and Egress:

→(EC-15965, R306)

Ingress and egress for this fire area are provided through three fire doors. One door (D194) located on the west wall leads to fire area RAB 25 (at EL. +21.00 msl via a ladder) door (D192) located on the east wall leads to RAB IE and fire door (D179) located on the east wall connecting to fire area RAB 5. Door D194 is provided with an "A" label and doors D179 and D192 are provided with a letter of equivalence.

←(EC-15965, R306)

b. Detection:

Ionization smoke detectors are provided for this fire area.

RAB 6

c. Fire Protection:

Primary:

A pre-action automatic sprinkler system is provided for this entire fire area including individual cable tray protection. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→ (DRN 00-343)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

← (DRN 00-343)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal.
Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by gravity floor drains to the yard storm water system.

VI. Analysis of Effects of Potential Fires:

In the Electrical Penetration Area 'A,' in situ combustible materials include substantial amounts of cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of cable insulation. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic area wide suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "A" and "AB" equipment. Safe plant shutdown can be accomplished by using "B" train safe shutdown components and the control of radioactive releases to the environment is maintained.

RAB 6

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The existence of 1-1/2 hour fire dampers in 3-hour rated fire boundaries.

2. The existence of block wall-to-slab seal assemblies without documented hourly fire ratings.

b. The basis for these exceptions is as follows:

1. The existence of the following 1-1/2 hour rated fire dampers in fire area boundaries: FD-46, FD-50 and two fire dampers in 42 inch ducts, one of which is located in the ceiling and the other in the floor.

a) Smoke detection exists on both sides of each damper except where pipe chases are involved.

b) Fire severity of adjacent areas is less than the fire rating of each damper.

2. Lack of a documented hourly fire rating based on ASTM E-119 for Stairwell Enclosure 10 at Column 8A and other gap sealed fire walls on this elevation.

a) The gap sealed walls of the stairwell enclosure have sprinklers and smoke detectors on one side of the enclosure walls.

→ (LBDCR 14-020, R308)

b) The stairwell enclosure contains negligible combustibles.

←(LBDCR 14-020, R308)

c) The balance of gap sealed fire walls on this elevation have sprinklers and detection on both sides.

RAB 7

1. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +35.00 Ft. MSL
b. Space Name: RELAY ROOM ENVELOPE
c. Figure No.: 9.5.1-21 Approximate Coordinates: Cols, 11A, G-K
d. Floor Area: 2,483 sq ft
e. Zones Within the Fire Area:

RAB 7A - Relay Room 'A'
RAB 7B - Relay Room 'B'
RAB 7C - Relay'Room (Isolation Panel)
RAB 7D - Relay Room 'AB'

II. Essential Equipment Within the Fire Area:

RAB 7

See RAB 7A, 7B, 7C and 7D.

III. In situ Combustible Material Loadings: Consist of, but are not limited to, cable insulation and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

See RAB 7A, 7B, 7C and 7D.for fire zone durations.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

→(EC-15965, R306)

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
East Wall	S	12x12	Yes (FD-53)	X	
East Wall	T	12x12	Yes (FD-75)	X	
East Wall	S	20x12	Yes (FD-61)	X	
North Wall	E	36x24	Yes (FD-170)		X
East Wall	S	24x12	Yes (FD-51)	X	

←(EC-15965, R306)

All piping and tray penetrations are sealed.

See RAB 7A, 7B, 7C and 7D.

3. Ingress and Egress:

Adequate ingress and egress for this fire area are provided through fire doors leading to and from various fire areas and zones. See RAB 7A, 7.B, 7C and 7D.

b. Detection:

See RAB 7A, 7B, 7C and 7D.

c. Fire Protection:

See RAB 7A, 7B, 7C and 7D.

d. Smoke Venting:

See RAB 7A, 7B, 7C and 7D.

e. Drainage:

See RAB 7A, 7B, 7C and 7D.

VI. Analysis of Effects of Potential Fires:

See RAB 7A, 7B, 7C and 7D.

VII. Appendix R Deviations:
See RAB 7A, 7B, 7C and 7D.

RAB 7A

I. Description of Fire Zone:

a. Building: REACTOR AUXILIARY Elev: +35.00 Ft- MSL
b. Space Name: RELAY ROOM 'A'
c. Figure No.: 9.5.1-21 Approximate Coordinates: Cols, 11A, G-K
d. Floor Area: 1,342.5 sq ft
e. Subspaces Within the Fire Zone: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “B”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “B” (and “AB”, until DC-EBAT-AB is depleted) w/ S/G 1 and 2

←(EC-19062, R306)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump “B”
d. Essential Electrical Support: Train “B” (EDG)
e. Essential Mechanical Support: ECW Train “B”
CCW Train “B” w/ “B” DCT
ACCW Train “B” w/ “B” WCT
HVC Train “B”
HVR Train “B”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Zone Boundary Barriers:

Fire zone boundary design ratings are I hour between zones and 3 hours for the envelope perimeter.

→(DRN 03-993, R13)

Selected essential (Safe Shutdown) raceways are provided with one-hour fire rated barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

RAB 7A

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
East Wall	S	12x12	Yes (FD-53)	X	
East Wall	T	12x12	Yes (FD-75)	X	

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire zone are provided through three fire doors (Dl75, D209B and D219) located on west, north and east walls connecting to fire zone RAB 1E, fire zone RAB 7D and 4 fire area RAB 3, respectively. These doors are provided with spill retention curbs. Door D209B is provided with an "A" label for the door and a letter of equivalence for the frame, and doors D175 and D219 are provided with letters of equivalence.

b. Detection:

→ (DRN 99-1018, R11)

Ionization smoke detectors are provided for this fire zone.

← (DRN 99-1018, R11)

c. Fire Protection:

Primary:

→ (DRN 99-1018, R11)

A preaction automatic sprinkler system is provided for this entire fire zone. Portable fire extinguishers are provided outside of the fire zone in accordance with the guidelines of NFPA. 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

← (DRN 99-1018, R11)

Secondary:

→ (DRN 00-343, R11, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this zone. Specific locations of hose stations are indicated on General Arrangement drawings.

← (DRN 00-343, R11, R11)

d. Smoke Venting:

The nomal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by openings of doors and stairways leading to immediate adjacent areas which are provided with water removal capabilities.

VI. Analysis of Effects of Potential Fires:

In the Relay Room "A," in situ combustible materials include moderate amounts of cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

RAB 7A

Two types of fires have been postulated for this zone. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of cable insulation. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic zone wide suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to the "A" train Auxiliary Panel, Auxiliary Isolation Panel, and Power Distribution Panels. Safe plant shutdown can be accomplished using "B" train shutdown equipment and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this zone, specifically:

1. The need for a complete 1-hour barrier between redundant safe shutdown equipment.

2. The existence of block wall-to-slab seal assemblies without documented hourly fire ratings.

b. The basis for these exceptions is as follows:

1. Part height 1-hour rated walls with Class B fire doors constructed to isolate Auxiliary Panel 3 (A/B) from Auxiliary Panel I (SA):

→(EC-18551, R304)

a) Automatic detection and suppression provided over all redundant safe shutdown equipment in the area. Automatic ionization detection is provided for each cubicle in the Isolation Panel.

b) Walls constitute a complete 1-hour separation (including doors and penetrations) up to the height of the wall

c) Negligible fire load in each fire zone.

d) Administrative controls and low traffic volume limit the introduction of significant amounts of combustible materials. This fire area is classified as a level I area per EN-DC-161 “Control of Combustible Materials” which is a combustible exclusion area.

e) Portable fire extinguishers and inside standpipe hose connections are provided for use by the trained fire brigade for manual fire fighting.

f) One train of redundant cabling enclosed in a I-hour rated wrap throughout each fire zone where two redundant safe shutdown trains occur.

g) Construction and location of the partial-height fire barrier provides adequate protection from the radiative effects of a fire postulated on either side. The area containing these partial-height barriers is a relatively small volume room with ceiling heights approximately 10 feet and construction is reinforced concrete & concrete block. Therefore, formation of a hot gas

←(EC-18551, R304)

RAB 7A

→(EC-18551, R304)

layer forming in the ceiling is a concern in this area due to the small volume room and relatively low ceiling height. For these reasons, fire loading in this area is more critical. These attributes (construction and location of partial-height fire barrier, building construction and small volume area, automatic suppression, & enclosure of one train of redundant cabling in a 1-hour fire rated wrap throughout each fire zone where two redundant safe shutdown trains occur) are considered adequate for negligible fire loading. Negligible fire loading at WF3 is defined as combustible fire load up to 15 minute duration. Maintaining a negligible fire load with the other attributes identified above ensures that a fire on either side of the partial-height barrier will not damage redundant safe shutdown components on the other side.

←(EC-18551, R304)

2. Lack of documented hourly fire rating based on ASTM E-119 for gap sealed walls.

a) The gap sealed walls in this zone have sprinklers and detectors on both sides.

RAB 7B

I. Description of Fire Zone:

a. Building: REACTOR AUXILIARY Elev: +35.00 Ft- MSL
b. Space Name: RELAY ROOM 'B'
c. Figure No.: 9.5.1-21 Approximate Coordinates: Cols, 11A, G-K
d. Floor Area: 827.25 sq ft
e. Subspaces Within the Fire Zone: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “A”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “A” w S/G 1 and S/G 2

←(EC-19062, R306)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump “A”
d. Essential Electrical Support: Train “A” (EDG & Offsite)
e. Essential Mechanical Support: ECW Train “A”
CCW Train “A” w/ “A” DCT
ACCW Train “A” w/ “A” WCT
HVC Train “A”
HVR Train “A”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Zone Boundary Barriers:

Fire zone boundary design ratings are 1 hour between zones and 3 hours for the envelope perimeter.

→(DRN 03-993, R13)

All vertical cable trays are provided with firebreaks at approximately 15 foot intervals. Selected essential (Safe Shutdown) raceways are provided with one-hour fire related barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
East Wall	S	20x12	Yes (FD-61)	X	
North Wall	E	36x24	Yes		X

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire zone the are provided through two fire doors (D218 and D209A) located on the north and south walls connecting to fire area RAB 3 and fire zone RAB 7D, respectively. These doors are provided with spill retention curbs. Door D218 is provided with a letter of equivalence and door D209A is provided with an "A" label.

b. Detection:

→(DRN 99-1018, R11)

Ionization smoke detectors are provided for this fire zone.

←(DRN 99-1018, R11)

c. Fire Protection:

Primary:

→(DRN 99-1018, R11)

A preaction automatic sprinkler system is provided for this entire fire zone. Portable fire extinguishers are provided outside of the fire zone in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

←(DRN 99-1018, R11)

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this zone. Specific locations of hose stations are indicated on General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by openings of doors and stairways leading to immediate adjacent areas which are provided with water removal capabilities.

VI. Analysis of Effects of Potential Fires:

In the Relay Room 'B,' in situ combustible materials include moderate amounts of cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this zone. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of cable insulation. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic zone wide suppression, and a trained fire brigade.

→(DRN 03-993, R13)

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to the "B" train Auxiliary Panel, Auxiliary Isolation Panel and Power Distribution Panels. Safe plant shutdown can be accomplished by using "A" train shutdown equipment and the control of radioactive releases to the environment is maintained.

←(DRN 03-993, R13)

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this zone, specifically:

1. The need for a complete 1-hour barrier between redundant safe shutdown equipment.

2. The enclosure of redundant cable tray and conduit in the same 1-hour rated fire wrap.

3. The existence of block wall-to-slab seal assemblies without documented hourly fire ratings.

b. The basis for these exceptions is as follows:

RAB 7B

1. Part height 1-hour rated walls with Class B fire doors constructed to isolate:

- Auxiliary Panel 3 (A/B) from Auxiliary Panel 2(SB)

→(EC-18551, R304)

a) Automatic detection and suppression provided over all redundant safe shutdown equipment in the area. Automatic ionization detection is provided for each cubicle in the Isolation Panel.

b) Walls constitute a complete 1-hour separation (including doors and penetrations) up to the height of the wall

c) Negligible fire load in each fire zone.

d) Administrative controls and low traffic volume limit the introduction of significant amounts of combustible materials. This fire area is classified as a level I area per EN-DC-161 “Control of Combustible Materials” which is a combustible exclusion area.

e) Portable fire extinguishers and inside standpipe hose connections are provided for use by the trained fire brigade for manual fire fighting.

f) One train of redundant cabling enclosed in a 1-hour rated wrap throughout each fire zone where two redundant safe shutdown trains occur.

g) Construction and location of the partial-height fire barrier provides adequate protection from the radiative effects of a fire postulated on either side. The area containing these partial-height barriers is a relatively small volume room with ceiling heights approximately 10 feet and construction is reinforced concrete & concrete block. Therefore, formation of a hot gas layer forming in the ceiling is a concern in this area due to the small volume room and relatively low ceiling height. For these reasons, fire loading in this area is more critical. These attributes (construction and location of partial-height fire barrier, building construction and small volume area, automatic suppression, & enclosure of one train of redundant cabling in a 1-hour fire rated wrap throughout each fire zone where two redundant safe shutdown trains occur) are considered adequate for negligible fire loading. Negligible fire loading at WF3 is defined as combustible fire load up to 15 minute duration. Maintaining a negligible fire load with the other attributes identified above ensures that a fire on either side of the partial-height barrier will not damage redundant safe shutdown components on the other side.

←(EC-18551, R304)

2. Enclosure of essential redundant cable tray and conduit in the same 1-hour wrap for the following systems controlled from the auxiliary control panel (LCP-43):

- Shutdown Cooling System
- Chemical and Volume Control System

a) Regulatory Guide 1.75 separation criteria provides reasonable assurance that an internal tray or conduit fire will not propagate to a redundant tray or conduit.

1) This separation between one cable tray and a redundant cable tray or conduit within the same fire wrap is accomplished by providing the subject cable tray with either a metal tray cover or a 1/2 inch blanket cover (i.e., 30 minute fire rating). Where access and spatial separation between cable trays allow, a 1-1/2 inch blanket tray cover (i.e., 1-hour fire rating) is preferred over a 1/2 inch blanket.

b) One-hour wrap provides sufficient protection to redundant cabling until actuation of automatic suppression system or arrival of fire brigade.

RAB 7B

3. Lack of documented hourly fire rating based on ASTM E-119 for gap sealed walls.

   a) The gap sealed walls in this zone have sprinklers and detectors on both sides.

RAB 7C

I. Description of Fire Zone:

   a. Building: REACTOR AUXILIARY Elev: +35.00 Ft. MSL
   b. Space Name: RELAY ROOM (Isolation Panel)
   c. Figure No.: 9.5.1-21 Approximate Coordinates: Cols, 11A, H-J
   d. Floor Area: 150 sq ft
   e. Subspaces Within the Fire Zone: None

→(DRN 03-993, R13; EC-18305, R305)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “B”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pumps “A/B” & “B” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “B”
d.	Essential Electrical Support:	Train “A” (Offsite) & Train “B” (EDG & Offsite)
e.	Essential Mechanical Support:	ECW Train “B” CCW Train “B” w/ “B” DCT ACCW Train “B” w/ “B” WCT HVC Train “B” HVR Train “B”

←(DRN 03-993, R13 ; EC-18305, R305)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

   a. Physical Containment:

      1. Fire Zone Boundary Barriers:

         Fire zone boundary design ratings are 1 hour between zones and 3 hours for the envelope perimeter.

→(DRN 03-993, R13; EC-18305, R305)

         Each compartment within the Isolation Panel is separated by a sheet metal wall sandwiched by 1/16 inch thick inorganic fiber insulation boards forming a fire retardant barrier.

←(DRN 03-993, R13 ; EC-18305, R305)

      2. HVAC Penetrations Through Boundary Barriers:

RAB 7C

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
East Wall	R	24x12	Yes (FD-51)	X	

The penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire zone are provided through two fire doors (D208A and D208B) located on the north and south walls connecting to fire zones RAB 7B and RAB 7A. These doors are provided with spill retention curbs. Doors D208A and D208B are provided with "A" labels and the door frames have a letter of equivalence.

b. Detection:

→(DRN 99-1018, R11)

Ionization smoke detectors are provided for this fire zone. Supplementally, ionization smoke detectors are provided in each separate compartment of the Isolation Panel, as a separate system.

←(DRN 99-1018, R11)

c. Fire Protection:

Primary:

→(DRN 99-1018, R11)

A preaction automatic sprinkler system is provided for this entire fire zone. Portable fire extinguishers are provided outside of the fire zone in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

←(DRN 99-1018, R11)

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this zone. Specific locations of hose stations are indicated on General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by openings bf doors and stairways leading to immediate adjacent areas which are provided with water removal capabilities.

VI. Analysis of Effects of Potential Fires:

In the Relay Room (Isolation Panel), in situ combustible materials include moderate amounts of cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

RAB 7C

Two types of fires have been postulated for this zone. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of cable insulation. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic zone wide suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "A" and "AB" train components and the Isolation Panel and its associated components. Safe plant shutdown can be accomplished by isolating the Isolation Panel via isolation switches and by using "B" train shutdown equipment and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this zone, specifically:

1. The need for a complete 1-hour barrier between redundant safe shutdown equipment.

2. The existence of block wall-to-slab seal assemblies without documented hourly fire ratings.

b. The basis for these exceptions is as follows:

1. Part height 1-hour rated walls with Class A fire doors constructed to isolate the Isolation Panel from Auxiliary Panel 1 (SA), Auxiliary Panel 2 (SB), and Auxiliary Panel 3 (SAB).

→(EC-18551, R304)

a) Automatic detection and suppression provided over all redundant safe shutdown equipment in the area. Automatic ionization detection is provided for each cubicle in the Isolation Panel.

b) Walls constitute a complete 1-hour separation (including doors and penetrations) up to the height of the wall

c) Negligible fire load in each fire zone.

d) Administrative controls and low traffic volume limit the introduction of significant amounts of combustible materials. This fire area is classified as a level 1 area per EN-DC-161 “Control of Combustible Materials” which is a combustible exclusion area.

e) Portable fire extinguishers and inside standpipe hose connections are provided for use by the trained fire brigade for manual fire fighting.

f) One train of redundant cabling enclosed in a 1-hour rated wrap throughout each fire zone where two redundant safe shutdown trains occur.

g) Construction and location of the partial-height fire barrier provides adequate protection from the radiative effects of a fire postulated on either side. The area containing these partial-height barriers is a relatively small volume room with ceiling heights approximately 10 feet and construction is reinforced concrete & concrete block. Therefore, formation of a hot gas layer forming in the ceiling is a concern in this area due to the small volume room and relatively low ceiling height. For these reasons, fire loading in this area is more critical. These

←(EC-18551, R304)

RAB 7C

→(EC-18551, R304)

attributes (construction and location of partial-height fire barrier, building construction and small volume area, automatic suppression, & enclosure of one train of redundant cabling in a 1-hour fire rated wrap throughout each fire zone where two redundant safe shutdown trains occur) are considered adequate for negligible fire loading. Negligible fire loading at WF3 is defined as combustible fire load up to 15 minute duration. Maintaining a negligible fire load with the other attributes identified above ensures that a fire on either side of the partial-height barrier will not damage redundant safe shutdown components on the other side.

h) The essential redundant train “A” and Train “B” portions of the Isolation Panel are separated by 1-hour partial-height walls on the outside of the singular cabinet housing as described above. On the inside of the panel the redundant trains are separated by a sheet metal wall sandwiched by 1/16 inch thick inorganic fiber insulation boards. This internal wall configuration provides electrical separation which meets IEEE-383-74 (Reg. Guide 1.75) separation requirements. This ensures that fire which starts one side of the sheet metal wall sandwich panel and damages one division of safe shutdown equipment will not damage redundant safe shutdown components on the other side.

←(EC-18551, R304)

2. Lack of documented hourly fire rating based on ASTM E-119 for gap sealed walls.

a) The gap sealed walls in this fire zone have sprinklers and detectors on both sides.

RAB 7D

I. Description of Fire Zone:

a. Building: REACTOR AUXILIARY Elev: +35.00 Ft- MSL
b. Space Name: RELAY ROOM 'AB'
c. Figure No.: 9.5.1-21 Approximate Coordinates: Cols, 11A, H-J
d. Floor Area: 163.5 sq ft
e. Subspaces Within the Fire Zone: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “A”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A” and “B” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “A” and “B”
d.	Essential Electrical Support:	Train “A” and “B” (EDG & Offsite)
e.	Essential Mechanical Support:	ECW Train “A” and “B” CCW Train “A” and “B” w/ “A” and “B” DCT ACCW Train “A” and “B” w/ “A” and “B” WCT HVC Train “A” and “B” HVR Train “A” and “B”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Zone Boundary Barriers:

Fire zone boundary design ratings are 1 hour between zones and 3 hours for the envelope perimeter.

2. HVAC Penetrations Through Boundary Barriers:

There are no duct penetrations through this zone's fire barriers. The piping and cable tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire zone are provided through two fire doors (D209A and D209B) located on the north and south walls connecting to fire zones RAB 7B and RAB 7A. These doors are provided with spill retention curbs. Doors D209A and D209B are provided with "A" labels and the door frames have a letter of equivalence.

b. Detection:

→ (DRN 99-1018, R11)

Ionization smoke detectors are provided for this fire zone.

← (DRN 99-1018, R11)

c. Fire Protection:

Primary

→ (DRN 99-1018, R11)

A preaction automatic sprinkler system is provided for this entire fire zone. Portable fire extinguishers are provided outside of the fire zone in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

← (DRN 99-1018, R11)

Secondary

→ (DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this zone. Specific locations of hose stations are indicated on General Arrangement drawings.

← (DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by openings of doors and stairways leading to immediate adjacent areas which are provided with water removal capabilities.

VI. Analysis of Effects of Potential Fires:

In the Relay Room "AB," in situ combustible materials include moderate amounts of cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

RAB 7D

Two types of fires have been postulated for this zone. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of cable insulation. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic zone wide suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However", if an unmitigated fire is assumed, damage would be limited to the "AB" bus and its associated components, Charging Pump B and CCW Pump A. The continual control of radioactive releases to the environment is maintained and safe plant shutdown can be accomplished by using "B" train shutdown equipment with Charging Pump A or by using "A" train shutdown equipment with CCW Pump B.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this zone, specifically:

1. The need for a complete 1-hour barrier between redundant safe shutdown equipment.

2. The existence of block wall-to-slab seal assemblies without documented hourly fire ratings.

b. The basis for these exceptions is as follows:

1. Part height 1-hour rated walls with Class A fire doors constructed to isolate Auxiliary Panel 3 (SAB) from Auxiliary Panel 1 (SA), Auxiliary Panel 2 (SB), and the Isolation Panel.

→(EC-18551, R304)

a) Automatic detection and suppression provided over all redundant safe shutdown equipment in the area. Automatic ionization detection is provided for each cubicle in the Isolation Panel.

b) Walls constitute a complete 1-hour separation (including doors and penetrations) up to the height of the wall.

c) Negligible fire load in each fire zone.

d) Administrative controls and low traffic volume limit the introduction of significant amounts of combustible materials. This fire area is classified as a level 1 area per EN-DC-161 “Control of Combustible Materials” which is a combustible exclusion area.

e) Portable fire extinguishers and inside standpipe hose connections are provided for use by the trained fire brigade for manual fire fighting.

f) One train of redundant cabling enclosed in a 1-hour rated wrap throughout each fire zone where two redundant safe shutdown trains occur.

g) Construction and location of the partial-height fire barrier provides adequate protection from the radiative effects of a fire postulated on either side. The area containing these partial-height barriers is a relatively small volume room with ceiling heights approximately 10 feet and construction is reinforced

←(EC-18551, R304)

RAB 7D

→(EC-18551, R304)

concrete & concrete block. Therefore, formation of a hot gas layer forming in the ceiling is a concern in this area due to the small volume room and relatively low ceiling height. For these reasons, fire loading in this area is more critical. These attributes (construction and location of partial-height fire barrier, building construction and small volume area, automatic suppression, & enclosure of one train of redundant cabling in a 1-hour fire rated wrap throughout each fire zone where two redundant safe shutdown trains occur) are considered adequate for negligible fire loading. Negligible fire loading at WF3 is defined as combustible fire load up to 15 minute duration. Maintaining a negligible fire load with the other attributes identified above ensures that a fire on either side of the partial-height barrier will not damage redundant safe shutdown components on the other side.

←(EC-18551, R304)

2. Lack of documented hourly fire rating based on ASTM E-119 for gap sealed walls.

   a) The gap sealed walls in this zone have sprinklers and detectors on both sides.

RAB 8

I. Description of Fire Area:

a. Building: REACTOR ATJXILIARY Elev: +21.00 Ft. MSL
b. Space Name: SWITCHGEAR ENVELOPE
c. Figure No.: 9.5.1-5, Dwg. G210 and Dwg. G1368
Approximate Coordinates: Cols, 8A-12A, G-Q
d. Floor Area: 15,720 sq ft
e. Zones Within the Fire Area:

RAB 8A - Switchgear Room A
RAB 8B - Switchgear Room B
RAB 8C - Switchgear Room A/B

II. Essential Equipment Within the Fire Area:

See RAB 8A, 8B, and 8C

III. In situ Combustible Material Loadings: Consist of, but are not limited to, cable insulation and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

See RAB 8A, 8B, and 8C

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

RAB 8

See RAB 8A, 8B, and 8C

3. Ingress and Egress:

Adequate ingress and egress for this area are provided through fire doors leading to and from various fire areas and zones. See RAB 8A, 8B, and 8C

b. Fire Detection System:

See RAB 8A, 8B, and 8C

c. Fire Protection System:

See RAB 8A, 8B, and 8C

d. Smoke Venting:

See RAB 8A, 8B, and 8C

e. Drainage:

See RAB 8A, 8B, and 8C

VI. Analysis of Effects of Postulated Fires:

See RAB 8A, 8B, and 8C

VII. Appendix R Deviations:

See R" 8A, 8B, and 8C

RAB 8A

I. Description of Fire Zone:

a. Building: REACTOR AUXILIARY Elev: +21.00 Ft. MSL
b. Space Name: SWITCHGEAR ROOM A
c. Figure No.: 9.5.1-5 Approximate Coordinates: Cols, 8A-12A, G-J
d. Floor Area: 4,448 sq ft
e. Subspaces Within the Fire Zone: Computer Battery Room (324 sq. ft)

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “B”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “B” w/ S/G 1 and 2

←(EC-19062, R306)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump “B”
d. Essential Electrical Support: Train “B” (EDG)
e. Essential Mechanical Support: ECW Train “B”
CCW Train “B” w/ “B” DCT
ACCW Train “B” w/ “B” WCT
HVC Train “B”
HVR Train “B”

←(DRN 03-993, R13)

→(DRN 03-993, R13)
←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Zone Boundary Barriers:

Fire zone boundary design ratings are 1 hour between zones RAB 8A and 8C and 3 hours for the envelope perimeter.

→(DRN 03-993, R13)

All vertical cable trays are provided with firebreaks at approximately 15 foot intervals. Selected essential (Safe Shutdown) raceways are provided with one-hour fire rated barriers are determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
Floor	S	16 D	Yes (FD-25)	X	
Floor	S	16 D	Yes (FD-26)	X	
Floor	S	16 D	Yes (FD-27)	X	
Floor	S	16 D	Yes (FD-28)	X	
Ceiling Slab of Computer Battery Room	S	16x16	No	X	
Ceiling	S	20x18	Yes (FD-52)	X	
Ceiling Slab of Computer Battery Room	E	10x10	No	X	
Floor	S	16 D	Yes (FD-29)	X	
Ceiling	E	10x10	Yes (FD-54)	X	
→(EC-15965, R306) North Wall ←(EC-15965, R306)	R	60’x3’	No	X	

All piping and tray penetrations are sealed through rated barriers.

3. Ingress and Egress:

Ingress and egress for this fire zone are provided through two fire doors located on the north wall. One door (DI8) connects to fire area RAB 23 and the other door (D7) connects to fire zone RAB 8C. Doors D7 and D18 are provided with "A" labels. The frame of D7 is provided with a letter of equivalence.

b. Detection:

→ (DRN 99-1018)

Ionization smoke detectors are provided for this fire zone.

← (DRN 99-1018)

c. Fire Protection:

Primary:

A preaction automatic sprinkler system is provided for this entire fire zone with the exception of the Computer Battery Room. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

→ (DRN 99-1018)

Secondary:

→ (DRN 00-343)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this zone. Specific locations of hose stations are indicated on the General Arrangement drawings.

← (DRN 00-343)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal.
Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by opening of doors and stairways leading to immediate adjacent areas which are provided with water removal capabilities.The Computer Battery Room has floor drains to the sanitary drainage system.

VI. Analysis of Effects of Potential Fires:

In the Switchgear Room 'A,' in situ combustible materials include ordinary combustible materials and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this zone. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or ordinary combustible materials. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls to limit quantities of transient and in situ ordinary combustible materials.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic suppression, and a trained fire brigade. Subspaces within this fire zone have no essential equipment.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "A" train equipment. Safe plant shutdown can be accomplished by using "B" train shutdown components and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 1OCFR50, Appendix R, Section III.G.2 has been granted in this zone, specifically:

1. The need for a complete 1-hour barrier between redundant safe shutdown equipment.
2. The existence of 1-1/2 hour fire dampers.
3. The need for total zone wide coverage of automatic fixed suppression systems (Computer Battery Room).

b. The basis for these exceptions is as follows:

1. Part height 1-hour walls constructed between redundant switchgear rooms RAB 8A and 8C:

→(EC-18551, R304)

a. Automatic detection and suppression provided over all redundant safe shutdown equipment in the area.
b. Walls constitute a complete 1-hour separation (including penetrations) up to the height of the all.
c. Low fire load in the fire area.
d. Administrative controls and low traffic volume limit the introduction of significant amounts of combustible materials.
e. Portable fire extinguishers and inside standpipe hose connections are provided for use by the trained fire brigade for manual fire fighting.
f. One train of redundant cabling is enclosed in a 1-hour fire rated wrap.
g. Construction and location of the partial-height fire barrier provides adequate protection from the radiative effects of a fire postulated on either side. The area containing the partial-height barrier is a large volume room with ceiling heights approximately 22 feet and construction is reinforced concrete. Therefore, a hot gas layer forming in the ceiling is not creditable based on type

←(EC-18551, R304)

RAB 8A

→(EC-18551, R304)

construction and large volume area. These attributes (construction and location of partial-height fire barrier, building construction and large volume area, automatic suppression, & enclosure of one train of redundant cabling in a 1-hour fire rated wrap) are considered adequate for combustible fire loads up to 1-hour which is considered a low fire loading. This ensures that a fire on either side of the partial-height barrier will not damage redundant safe shutdown components on the other side.

←(EC-18551, R304)

2. Existence of the following 1-1/2 hour fire dampers located in the zone boundaries: FD-25, FD-26, FD-27, FD-28 and FD-29.

   a. Detection and suppression exist on both sides of damper.

   b. Fire severity of zones/areas adjacent to each damper are less than the fire rating of subject damper.

3. Absence of automatic fixed suppression for the Computer Battery Room.

   a. No safe shutdown equipment.

   b. Smoke detection and automatic fixed suppression in adjoining area will check propagation of fire until arrival of the fire brigade.

   c. Negligible combustible loading.

   d. Smoke detection provided

RAB 8B

I. Description of Fire Zone:

a. Building: REACTOR AUXILIARY Elev: +21.00 Ft. MSL
b. Space Name: SWITCHGEAR ROOM B
c. Figure No.: 9.5.1-5, Dwg. G210 and Dwg. G1368
Approximate Coordinates: Cols) 8A-11A, J-Q
d. Floor Area: 8,697 sq ft
e. Subspaces Within the Fire Zone: CEA Drive M/G Set Room (672 sq ft) H&V Fan Room (960 sq ft)

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “A”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “A” and A/B w/ S/G 1 and 2

←(EC-19062, R306)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump “A”
d. Essential Electrical Support: Train “A” (EDG)
e. Essential Mechanical Support: ECW Train “A”
CCW Train “A” w/ “A” DCT
ACCW Train “A” w/ “A” WCT
HVC Train “A”
HVR Train “A”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Zone Boundary Barriers:

Fire zone boundary design rating is 1 hour between zones 8B and 8C and 3 hours for the envelope perimeter.

→(DRN 03-993, R13)

All vertical cable trays are provided with firebreaks at approximately 15 foot intervals. Selected essential (Safe Shutdown) raceways are provided with one-hour fire rated barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
Floor	R	46x18	Yes (FD-16)	X	
Floor	R	46x18	Yes (FD-17)	X	
Floor	E	18 D	Yes (FD-31A)	X	
Ceiling	E	18 D	Yes (FD-49)	X	
Ceiling	S	24x24	Yes (FD-66)	X	
East Wall	SV	50x50	No		X
East Wall	S	24x16	No	X	
West Wall	S	30x16	No	X	
South Wall	T	36x30	No	X	
South Wall	S	30x30	No	X	
→(EC-15965, R306)					
West Wall	E	8 D	Yes (FD-157)		X
←(EC-15965, R306)					
South Wall	S	24x14	No	X	
Ceiling-CEA Drive M/G set Room	S	26x30	Yes (FD-72)	X	
West Wall - H&V Fan Room (+35 ft elevation)	E	18x18	Yes (FD-216A)		X
→(EC-15965, R306)					
South Wall	S	16x12	No	X	
South Wall	R	60'x3'	No	X	
←(EC-15965, R306)					

All piping and tray penetrations are sealed in fire rated barriers.

3. Ingress and Egress:

Ingress and egress for this fire zone are provided through fire door (D9) located on the east wall connecting to fire zone RAB 8C, and the other fire door (D53) connecting to closed stairwell located at Columns L-9A. which leads to fire areas RAB 5 and RAB 2 at EL. +35.00 and +46.00, respectively. One tornado door (D51)is located on the northeast wall leading outside to cooling tower area. A fire door (DI7), located in the south wall of the CEA Drive M/G Set Room connects to an enclosed stairwell at column J-8A. This stairwell leads to Fire Area RAB31. Door D9 is provided with an "A" label and its frame is provided with a letter of equivalence. Door D53 is provided with a “B” Label. Door D17 is provided with an "A" label. Door D51 is an exterior door whose primary function is other than fire resistance.

b. Detection:

→ (DRN 99-1018)

Ionization smoke detectors are provided for this fire zone.

← (DRN 99-1018)

c. Fire Protection:

Primary:

→ (DRN 99-1018)

A preaction automatic sprinkler system is provided for this entire fire zone, with the exception of the subspaces. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

← (DRN 99-1018)

→ (DRN 00-343)

Secondary:

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this zone. Specific locations of hose stations are indicated on the General Arrangement drawings.

← (DRN 00-343)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal.
Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by opening of doors and stairways leading to immediate adjacent areas which are provided with water removal capabilities.

VI. Analysis of Effects of Potential Fires:

In the Switchgear Room 'B,' in situ combustible materials include normally expected amounts of cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this zone. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of cable insulation. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 or equivalent flame tested cables; limiting the continued spread penetrations; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "AB" and "B" train equipment. Safe plant shutdown can be accomplished by using "A" train shutdown components and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 1OCFR50, Appendix R, Section III.G.2 has been granted in this zone, specifically:

1. The need for a complete 1-hour barrier between redundant safe shutdown equipment.

2. The existence of 1-1/2 hour fire dampers.

3. The non-existence of a rated fire damper in a duct penetrating a 3-hour rated fire boundary.

4. The existence of block wall-to-slab seal assemblies without documented hourly fire ratings.

5. The need of total zone wide coverage of automatic fixed suppression systems.

b. The basis for these exceptions is as follows:

1. Part height 1-hour walls constructed between redundant switchgear rooms RAB 8B and 8C, and within 8B at the pressurizer heater switchgear:

→(EC-18551, R304)

a Automatic detection and suppression provided over all redundant safe shutdown equipment in the area.

b. Walls constitute a complete 1-hour separation (including penetrations) up to the height of the wall.

c. Low fire load in the fire area.

d. Administrative controls and low traffic volume limit the introduction of significant amounts of combustible materials.

e. Portable fire extinguishers and inside standpipe hose connections are provided for use by the trained fire brigade for manual fire fighting.

←(EC-18551, R304)

RAB 8B

→ (EC-18551, R304)

f. One train of redundant cabling is enclosed in a 1-hour fire rated wrap.

g. Construction and location of the partial-height fire barrier provides adequate protection from the radiative effects of a fire postulated on either side. The area containing the partial-height barrier is a large volume room with ceiling heights approximately 22 feet and construction is reinforced concrete. Therefore, a hot gas layer forming in the ceiling is not creditable based on type construction and large volume area. These attributes (construction and location of partial-height fire barrier, building construction and large volume area, automatic suppression, & enclosure of one train of redundant cabling in a 1-hour fire rated wrap) are considered adequate for combustible fire loads up to 1-hour which is considered a low fire loading. This ensures that a fire on either side of the partial-height barrier will not damage redundant safe shutdown components on the other side.

← (EC-18551, R304)

2. Existence of the following 1-1/2 hour fire dampers located in the zone boundaries: FD-49 and a third fire damper located in the west wall (8B) in an 8 inch diameter duct.

   a) Detection and suppression exist on both sides of damper.

   b) Fire severity of zone/areas adjacent to each damper are less than the fire rating of subject damper.

3. The non-existence of a fire damper for the duct (24" x 16") penetration located in the east wall (8B) in a 3-hour rated fire boundary.

   a) There is negligible fire loading in the adjacent corridor.

   b) Detection and suppression systems exist on west side of duct penetration.

4. Lack of a documented hourly fire rating based on ASTM E-119 for Stairwell Enclosure 9 at Column 9A.

   a) Gap sealed walls have sprinklers and smoke detectors on one side of the enclosure walls.

→(LBDCR 14-020, R308)

   b) The interior at the stairwell enclosure contains negligible combustibles.

←(LBDCR 14-020, R308)

5. Absence of automatic suppression for the CEA Drive M/G Set Room and H&V Fan Room.

   a. No safe shutdown equipment.

   b. Smoke detection and automatic fixed suppression in adjoining areas will check propagation of fire, if necessary, until arrival of the fire brigade.

RAB 8B

c. Negligible combustible loading.

d. Smoke detection provided.

RAB 8C

I. Description of Fire Zone:

a. Building: REACTOR AUXILIARY Elev: +21.00 Ft- MSL
b. Space Name: SWITCHGEAR ROOM A/B
c. Figure No.: 9.5.1-5 Approximate Coordinates: Cols, 9A-12A, H-K
d. Floor Area: 2,575 sq ft
e. Subspaces Within the Fire Zone: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “A”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “A”
d.	Essential Electrical Support:	Train “A” (EDG)
e.	Essential Mechanical Support:	ECW Train “A”
		CCW Train “A” w/ “A” DCT
		ACCW Train “A” w/ “A” WCT
		HVC Train “A”
		HVR Train “A”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Zone Boundary Barriers:

Fire zone boundary design ratings are 1 hour between zones 8C, 8A and 8B and 3 hours for the envelope perimeter.

→(DRN 03-993, R13)

All vertical cable trays are provided with firebreaks at approximately 15 foot intervals. Selected essential (Safe Shutdown) raceways are provided with one-hour fire related barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

RAB 8C

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
East Wall	S	1Ox4	Yes (FD-24)	X	
North Wall	S	24x16	No	X	
→(EC-15965, R306)					
North Wall	S	16x12	No	X	
North Wall	R	60'x3'	No	X	
South Wall	R	60'x3'	No	X	
←(EC-15965, R306)					
Ceiling	R	8Ox24	Yes (FD-60)	X	
Ceiling	S	3Ox24	Yes (FD-59)	X	
Ceiling	E	8x8	Yes (FD-18)	X	
Ceiling	E	8x8	Yes (FD-21)	X	
Ceiling	E	8x8	Yes (FD-23)	X	
Ceiling of Bat. Rm.	S	8x8	Yes (FD-19)	X	
Ceiling of Bat. Rm.	S	8x8	Yes (FD-20)	X	
Ceiling of Bat. Rm.	S	8x8	Yes (FD-22)	X	

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire zone are provided through four fire doors. First door (Dll) located on the north wall connecting to vestibule on EL. +21-00 ft msl, the second door (D9) located on the east wall connecting to fire zone RAB 8B and third and fourth doors (D7 and D20) located on the south wall connecting to fire zone RAB 8A and closed stairwell at Columns J-12A, respectively. The stairwell leads to fire area RAB 30 at EL. -4.00 ft msl. Ingress and egress for this zone is also provided through a door located on the east wall leading to outside area. Doors D7, D9 and Dll are provided with "A" labels and the frames of doors D7 and D9 are provided with letters of equivalence. Door D20 is provided with a "B" Label.

b. Detection:

→ (DRN 99-1018, R11)

Ionization smoke detectors are provided for this fire zone.

← (DRN 99-1018, R11)

c. Fire Protection:

Primary:

→ (DRN 99-1018, R11)

A preaction automatic sprinkler system is provided for this entire fire zone. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

← (DRN 99-1018, R11)

Secondary:

→ (DRN 00-343)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this zone. Specific locations of hose stations are indicated on the General Arrangement drawings.

← (DRN 00-343)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal.
Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by opening of doors and stairways leading to immediate adjacent areas which are provided with water removal capabilities.

VI. Analysis of Effects of Potential Fires:

In the Switchgear Room A/B, in situ combustible materials include normally expected amounts of cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this zone. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of cable insulation. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic zone wide suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "AB" train equipment and some "B" train ESCW system components. Safe plant shutdown can be accomplished by using "A" train shutdown equipment and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 1OCFR50, Appendix R, Section III.G.2 has been granted in this zone, specifically:

1. The need for a complete 1-hour barrier between redundant safe shutdown equipment.

2. The lack of fire dampers in the fire boundaries.

3. The existence of block wall-to-slab assemblies without documented hourly fire ratings.

4. The enclosure of redundant cable tray and conduit in the same 1-hour rated fire wrap.

b. The basis for these exceptions is as follows:

1. Part height 1-hour walls constructed between redundant switchgear rooms RAB 8A, 8B and 8C:

→(EC-18551, R304)

a) Automatic detection and suppression provided over all redundant safe shutdown equipment in the area.

b) Walls constitute a complete 1-hour separation (including penetrations) up to the height of the wall.

c) Low fire load in the fire area.

d) Administrative controls and low traffic volume limit the introduction of significant amounts of combustible materials.

e) Portable fire extinguishers and inside standpipe hose connections are provided for use by the trained fire brigade for manual fire fighting.

f) One train of redundant cabling is enclosed in a 1-hour fire rated wrap.

g) Construction and location of the partial-height fire barrier provides adequate protection from the radiative effects of a fire postulated on either side. The area containing the partial-height barrier is a large volume room with ceiling heights approximately 22 feet and construction is reinforced concrete. Therefore, a hot gas layer forming in the ceiling is not creditable based on type construction and large volume area. These attributes (construction and location of partial-height fire barrier, building construction and large volume area, automatic suppression, & enclosure of one train of redundant cabling in a 1-hour fire rated wrap) are considered adequate for combustible fire loads up to 1-hour which is considered a low fire loading. This ensures that a fire on either side of the partial-height barrier will not damage redundant safe shutdown components on the other side.

←(EC-18551, R304)

2. The non-existence of fire dampers for the duct (24x16) penetrations located in the north wall (8C) in 3-hour rated fire boundaries:

a) There is negligible fire loading in the adjacent corridor.

b) Detection and suppression systems exist on south side of duct penetrations.

3. Lack of a documented hourly fire rating based on ASTM E-119 for Stairwell Enclosure 5 at Column 12A/J.

a) Gap sealed walls have sprinklers and smoke detectors on one side of the enclosure walls.

b) The interior at the stairwell enclosure contains negligible combustibles.

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This information on RAB 8D, 8E & 8F has been deleted.

RAB 8C

4. Enclosure of essential redundant cable tray/conduit in the same 1-hour wrap for the following systems:

- Standby Emergency Diesel Generator System
- Component Cooling Water System
- Component Cooling Water Makeup System
- Emergency Feedwater System

a) Regulatory Guide 1.75 separation criteria provides reasonable assurance that an internal tray or conduit fire will not propagate to a redundant tray or conduit.

1) This separation between one cable tray and a redundant cable tray or conduit within the same fire wrap is accomplished by providing the subject cable tray with either a metal tray cover or a 1/2 inch blanket cover (i.e., 30-minute fire rating). Where access and spatial separation between cable trays allow, a 1-1/2 inch blanket tray cover (i.e., 1-hour fire rating) is preferred over a 1/2 inch blanket.

b) One-hour wrap provides sufficient protection to redundant cabling until actuation of automatic suppression system or arrival of fire brigade.

RAB 9

I. Description of Fire Area: Elev: +21.00 Ft. MSL

a. Building: REACTOR AUXILIARY
b. Space Name: AUXILIARY CONTROL PANEL
c. Figure No.: 9.5.1-5 Approximate Coordinates: Cols, 11A-12A, J-K
d. Floor Area: 196 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “A”, “AB”, “B”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “A”, “AB” and “B” w/ S/G 1 and 2

←(EC-19062, R306)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump “A” and “B”
d. Essential Electrical Support: Train “A” and “B” (EDG & Offsite) and “AB”
e. Essential Mechanical Support: ECW Train “A” and “B”
CCW Train “A” and “B” w/ “A” and “B” DCT
ACCW Train “A” and “B” w/ “A” and “B” WCT
HVC Train “A” and “B”
HVR Train “A” and “B”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

→(DRN 03-993, R13)

Fire area boundary design rating is 3 hours.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Damper	Fire Related	Safety-Related	Non-Safety-Related
West Wall	S	1Ox4		Yes (FD-24)	X	

All piping and tray penetrations are sealed.

3. Ingress and Egress

Ingress and egress for this fire area is provided through an "A" label fire door (D44) located on the south wall. This connects with fire zone RAB 8C.

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

RAB 9

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by openings of doors and stairways leading to immediate adjacent areas which are provided with water removable capabilities.

VI. Analysis of Effects of Potential Fires:

In the Auxiliary Control Panel Area, in situ combustible materials include ordinary combustible materials and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or ordinary combustible materials. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls to limit quantities of transient and in situ ordinary combustible materials.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to the auxiliary control panel, LCP-43. Essential instrumentation and controls on LCP-43 are electrically isolated from this panel via transfer switches. Thus, the capability for safe plant shutdown and the control of radioactive releases to the environment is maintained.

II. Appendix R Deviations:

No specific deviations from Appendix R to 1OCFR50 are requested for this area.

RAB 11

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +21.00 Ft. MSL
b. Space Name: BATTERY ROOM "3BS"
c. Figure No.: 9.5.1-5 Approximate Coordinates: Cols, 9A-10A, J-K
d. Floor Area: 230 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

→(EC-18843, R304)

a.	RCS Inventory and Pressure Control:	Charging Pump “A”, “AB”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “A”
d.	Essential Electrical Support:	Train “A” (EDG & Offsite) and “AB”
e.	Essential Mechanical Support:	ECW Train “A” CCW Train “A” w/ “A” DCT ACCW Train “A” w/ “A” WCT

←(DRN 03-993, R13; EC-18843, R304)

RAB 11

→(EC-18843, R304)

HVC Train “A”
HVR Train “A”

←(EC-18843, R304)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and battery cases molded of plastic. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
Ceiling	S	8x8	Yes (FD-19)	X	
Ceiling	E	8x8	Yes (FD-18)	X	

All piping and tray penetrations are sealed.

3. Ingress and Egress

Ingress and egress for this fire area is provided through an "A" label fire door (D32) located on the east wall. This connects with fire zone RAB 8C.

b. Detection:

→(DRN 99-1018, R11)

An ionization smoke detector is provided for this fire area.

←(DRN 99-1018, R11)

c. Fire Protection:

Primary:

Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

RAB 11

→(DRN 00-343, R11)

Secondary:

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by gravity floor drains to the sanitary drainage system.

VI. Analysis of Effects of Potential Fires:

In the Battery Room 3BS, in situ combustible materials include cable insulation and battery cases molded of flame retardant polycarbonate. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of battery cases. The second type is a transient combustible exposure fire. Potential fire severity is minimized by administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, and a trained fire brigade.

→(EC-18843, R304)

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, safe plant shutdown can be accomplished using "A" and/or "AB" train shutdown components and the control of radioactive releases to the environment is maintained.

←(EC-18843, R304)

VII. Appendix R Deviations:

No specific deviations from Appendix R to 10CFR50 are requested for this area.

RAB 12

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +21.00 Ft. MSL
b. Space Name: BATTERY ROOM "3ABS"
c. Figure No.: 9.5.1-5 Approximate Coordinates: Cols, 9A-10A, H-K
d. Floor Area: 339 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

→(EC-18843, R304)

a.	RCS Inventory and Pressure Control	Charging Pump A and B
b.	Decay Heat Removal (HSD)	EFW Pump A and B with S/G No.1 and 2
c.	Decay Heat Removal (CSD)	LPSI Pump A or B
d.	Essential Electrical Support	Train A (EDG) and Train B (EDG)
e.	Essential Mechanical Support	ECW Train A or B CCW Train A or B (with Train A or Train B DCT) ACCW Train A or B (with Train A or Train B WCT) HVC Train A or B HVR Train A or B

←(DRN 03-993, R13; EC-18843, R304)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and battery cases molded of plastic. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire-Damper	Safety-Related	Non-Safety Related
Ceiling	S	8x8	Yes (FD-20)	X	
Ceiling	E	8x8	Yes (FD-21)	X	

All piping and tray penetrations are sealed.

3. Ingress and Egress

Ingress and egress for this fire area is provided through a fire door (D15) located on the east wall. This connects with fire zone RAB 8C. Fire door D15 is provided with an “A” Label.

RAB 12

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by gravity floor drains to the sanitary drainage system.

VI. Analysis of Effects of Potential Fires:

In the Battery Room 3ABS, in situ combustible materials include cable insulation and battery cases molded of styrene-acrylonitrile plastic. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of battery cases. The second type is a transient combustible exposure fire. Potential fire severity is minimized by administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, and a trained fire brigade.

→(EC-18843, R304)

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, the A/B Busses can be secured from the control room. Safe plant shutdown can be accomplished using "A" and/or "B" train shutdown components and the control of radioactive releases to the environment is maintained.

←(EC-18843, R304)

RAB 12

VII. Appendix R Deviations:

No specific deviations from Appendix R to 10CFR50 are requested for this area.

RAB 13

I. Description of Fire Area: Elev: +21.00 Ft. MSL

a. Building: REACTOR AUXILIARY
b. Space Name: BATTERY ROOM "3AS"
c. Figure No.: 9.5.1-5 Approximate Coordinates: Cols, 9A-10A, H-J
d. Floor Area: 230 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

→(EC-18843, R304)

a.	RCS Inventory and Pressure Control:	Charging Pump “B” and “AB”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “B” or “AB” w/ S/G 1 or 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “B”
d.	Essential Electrical Support:	Train “B” (EDG & Offsite) and Train “AB”
e.	Essential Mechanical Support:	ECW Train “B” CCW Train “B” w/ “B” DCT ACCW Train “B” w/ “B” WCT HVC Train “B” HVR Train “B”

←(DRN 03-993, R13; EC-18843, R304)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and battery cases molded of plastic. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
Ceiling	S	8x8	Yes (FD-22)	X	
Ceiling	E	8x8	Yes (FD-23)	X	

All piping and tray penetrations are sealed.

3. Ingress and Egress

Ingress and egress for this fire area is provided through an "A" label fire door (DI4) located on the east wall. This connects with fire zone RAB 8C.

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings

Secondary:

Class 1 hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by gravity floor drains to the sanitary drainage system.

VI. Analysis of Effects of Potential Fires:

In the Battery Room 3AS, in situ combustible materials include cable insulation and battery cases molded of styrene-acrylonitrile plastic. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of battery cases. The second type is a transient combustible exposure fire. Potential fire severity is minimized by administrative controls of transient combustibles.

RAB 13

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, and a trained fire brigade.

→(EC-18843, R304)

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, safe plant shutdown can be accomplished by using "B" and/or "AB" train shutdown equipment and the control of radioactive releases to the environment is maintained.

←(EC-18843, R304)

VII. Appendix R Deviations:

No specific deviations from Appendix R to 10CFR50 are requested for this area.

RAB 15

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +21.00 Ft. MSL
b. Space Name: EMERGENCY DIESEL GENERATOR '3BS'
c. Figure No.: 9.5.1-5 Approximate Coordinates: Cols, 4A-7A, J-K
d. Floor Area: 1,988 sq ft
e. Zones Within the Fire Area: None

RAB 15

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “A”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “A” and “AB” w/ S/G 1 and S/G 2
c. Decay Heat Removal, Cold Shutdown: LPSI Pump “A”
d. Essential Electrical Support: Train “A” (EDG & Offsite), Train “B” (Offsite) and Train “AB”

←(EC-19062, R306)

e. Essential Mechanical Support: ECW Train “A”
CCW Train “A” w/ “A” DCT
ACCW Train “A” w/ “A” WCT
HVC Train “A”
HVR Train “A”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and lubricating oil. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

RAB 15

→(EC-9506, R302)

Fire area boundary design rating is 3 hours with the exception of the removable section of the south wall. The removable section is formed by a double wall panel assembly consisting of 4 inch thick panels separated by a 4 inch air gap. Each wall panel assembly has been fire rated by Underwriters Laboratory at 90 minutes on the EDG Room side (RAB 15) and 45 minutes on the Corridor side (RAB 23).

←(EC-9506, R302)

→(DRN 00-1778, R11-A; 03-993, R13)
←(DRN 00-1778, R11-A; 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
→(EC-15965, R306)					
West Wall	E	78x44	Yes (FD-153)		X
Ceiling	E	120x48	Yes (FD-174)		X
South Wall	E	18x14	Yes (FD-13)	X	
Ceiling	E	18x14	Yes (FD-35)	X	
South Wall	OAI	96x72	Yes (FD-14)	X	
North Wall	S	40x16	Yes (FD-129)		X
North Wall	S	8x8	Yes (FD-145)		X
North Wall	S	8x8	Yes (FD-144)		X
Ceiling	E	30 D	No	X	
North Wall	S	8x8	Yes (FD-146)		X
West Wall	S	20x32	Yes (FD-143)		X
North Wall	E	30x16	Yes (FD-132)		X
North Wall	E	8x8	Yes (FD-133)		X
North Wall	E	8x8	Yes (FD-134)		X
West Wall	E	7x20	Yes (FD-135)		X
→(DRN 02-220, R11-A)					
Ceiling*	E	72x72	Yes (FD-76)	X	
←(DRN 02-220, R11-A)					
South Wall	S	16x10	Yes (FD-149)		X
←(EC-15965, R306)					

*Fire damper FD-76 is 92x92 and located at the end of the exhaust duct in the Diesel Generator room, in proximity of Penetration 1. The duct between the penetration and the fire damper is wrapped with 3-hour fire resistant material

3. Ingress and Egress:

Ingress and egress for this fire area are provided through two fire doors (D23 and D24). They are both located in the south wall and connect to fire area RAB 23. These doors are provided with spill retention curbs. Fire door D23 is provided with an "A" label. Door D24 is provided with a letter of equivalence.

b. Detection:

→(DRN 99-1018, R11)

Heat detection is provided for this fire area.

←(DRN 99-1018, R11)

c. Fire Protection:

Primary:

A pre-action automatic sprinkler system is provided for this entire fire area. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains and pumped into the Turbine Building industrial waste discharge header.

VI. Analysis of Effects of Potential Fires:

In the Emergency Diesel Generator Room '3BS,' in situ combustible materials include lubricating oil within diesel engine and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or lubricating oil released from diesel engine. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; the confinement and drainage of released combustible liquids; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic area wide suppression, and a trained fire brigade.

RAB 15

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "B" train components and the "AB" train CCW and ESCW system's components. Safe plant shutdown can be accomplished by using "A" train shutdown equipment and the control of radioactive materials to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted to the extent that it requires fire areas to be separated by 3-hour fire rated construction walls, specifically:

→(EC-9506, R302)

1. Separation between fire area RAB 15 and fire area RAB 23 by a removable section in the south wall of the EDG Room (RAB 15) of a rating less than 3 hours.

b. The basis for this deviation is:

1. The removable section is formed by a double wall panel assembly consisting of 4 inch thick panels separated by a 4 inch air gap. Each wall panel assembly has been fire rated by Underwriters Laboratory at 90 minutes on the EDG Room side (RAB 15) and 45 minutes on the Corridor side (RAB 23).
2. The area on both sides of the assembly is protected smoke detection and automatic fire suppression systems.
3. Adequate fire brigade and manual fire fighting equipment in the area.

←(EC-9506, R302)

RAB 15A

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +46.00 Ft MSL
b. Space Name: EMERGENCY DIESEL OIL FEED TANK "B" SPACE
c. Figure No.: 9.5.1-6 Approximate Coordinates: Cols, 1A-2A, H-J
d. Floor Area: 121 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “A” and “B”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A”, “B” and “AB” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “A” and “B”
d.	Essential Electrical Support:	Train “A” (EDG & Offsite), Train “B” (Offsite) and Train “AB”
e.	Essential Mechanical Support:	ECW Train “A” and “B” CCW Train “A” and “B” w/ “A” and “B” DCT ACCW Train “A” and “B” w/ “A” and “B” WCT HVC Train “A” and “B” HVR Train “A” and “B”

←(DRN 03-993, R13)

III. In situ Combustible Materials Loadings:

In situ combustible materials consist of, but are not limited to, diesel fuel contained in the feed tank. The potential fire duration is assumed not to exceed 3 hours since the diesel oil feed tank and associated piping meet seismic Category I and Safety Class 3 design and construction criteria. This design and construction criteria coupled with the heat dissipating capability of the liquid filled tank and piping provide adequate protection from the radiative and convective effects of a postulated fire until actuation of smoke detection and automatic fixed suppression or arrival of the fire brigade.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

No duct penetrations.

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area is provided through a door (D266) located on the east wall leading to the open roof on EL. +46.00 ft msl at Column J-2A. Door D266 is located on an exterior wall whose primary function is other than fire resistance.

b. Detection:

→ (DRN 99-1018, R11)

Heat detection is provided for this fire area.

← (DRN 99-1018, R11)

c. Fire Protection:

<u>Primary</u>

A pre-action automatic sprinkler system is provided for this fire area. Portable are extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

<u>Secondary:</u>

→ (DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

← (DRN 00-343, R11)

RAB 15A

d. Smoke Venting:

Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to oil sump at EL. -35.00 ft msl. Sump pumps discharge into the Turbine Building industrial waste discharge header.

VI. Analysis of Effects of Potential Fires:

In the Emergency Diesel Oil Feed Tank 'B' Space, in situ combustible materials include substantial amounts of diesel fuel oil contained in a single feed tank. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of diesel fuel oil released from the feed tank. The second type is a transient combustible exposure fire. Potential fire severity is minimized by the confinement and drainage of released combustible liquids, and administrative controls of transient combustibles. Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic area wide suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to Diesel Oil Feed Tank "B." Safe plant shutdown can be accomplished by using Diesel Oil Feed Tank "A" and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

No specific deviations from Appendix R to 1OCFR50 are requested for this area.

RAB 16

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +21.00 Ft. MSL
b. Space Name: EMERGENCY DIESEL GENERATOR "3AS"
c. Figure No.: 9.5.1-5 Approximate Coordinates: Cols, 1A-4A, J-K
d. Floor Area: 2,000 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “B” and “AB”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “B” and “AB” w/ S/G 1 and 2

←(DRN 03-993, R13; EC-19062, R306)

→(DRN 03-993, R13)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump "B"

→(EC-19062, R306)

d. Essential Electrical Support: Train "B" (Offsite), Train "A" (Offsite) and Train "AB"

←(EC-19062, R306)

e. Essential Mechanical Support: ECW Train "B"
CCW Train "B" w/ "B" DCT
ACCW Train "B" w/ "B" WCT
HVC Train "B"
HVR Train "B"

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and lubricating oil. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
West Wall	S	257x143	No	X	
→(EC-15965, R306)					
North Wall	S	10x14	Yes (FD-139)		X
North Wall	S	72x48	Yes (FD-140)		X
North Wall	E	8x14	Yes (FD-136)		X
East Wall	S	20x32	Yes (FD-143)		X
East Wall	E	7x20	Yes (FD-135)		X
East Wall	E	78x44	Yes (FD-153)		X
Floor	E	64x44	Yes (FD-155)		X
South Wall	E	14x44	Yes (FD-151)	X	
South Wall	S	62x48	Yes (FD-152)	X	
Ceiling*	E	72x72	Yes (FD-77)	X	
Ceiling	E	30D	No	X	
←(EC-15965, R306)					

*Fire damper FD-77 is 92x92 and located at the end of the exhaust duct in the Diesel Generator room, in proximity of Penetration 3. The duct between the penetration and the fire damper is wrapped with 3-hour fire resistant material.

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area are provided through three fire doors. One door (D30) on the north wall connects to fire area RAB 17, and the other two doors (D25 and D29) are on the south wall and connect to fire area RAB 23. These doors are provided with spill retention curbs. Doors D25 and D30 are provided with "A" labels. Door D29 is provided with a letter of equivalence.

b. Detection:

→ (DRN 99-1018, R11)

Heat detectors are provided for this fire area.

← (DRN 99-1018, R11)

c. Fire Protection:

Primary:

A pre-action automatic sprinkler system is provided for this entire fire area. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→ (DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

← (DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to pumps in oil sump No. 3 at EL. -35-00 ft msl. Pumps discharge into the Turbine Building industrial waste discharge header.

VI. Analysis of Effects of Potential Fires:

In the Emergency Diesel Generator '3AS,' in situ combustible materials include lubricating oil within diesel engine and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or lubricating oil released from diesel engine. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; the confinement and drainage of released combustible liquids; and administrative controls of transient combustibles.

RAB 16

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic area wide suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "A" train components and ESCW pump AB. Safe plant shutdown can be accomplished by using "B" train shutdown equipment and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

No specific deviations from Appendix R to 10CFR50 are requested for this area.

RAB 16A

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +46.00 Ft. MSL
b. Space Name: EMERGENCY DIESEL OIL FEED TANK "A" SPACE
c. Figure No.: 9.5.1-6 Approximate Coordinates: Cols, 1A-2A, H-J
d. Floor Area: 121 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “A”, “B” and “AB”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A”, “B” and “AB” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “A” and “B”
d.	Essential Electrical Support:	Train “A” (Offsite), Train “B” (EDG & Offsite) and Train “AB
e.	Essential Mechanical Support:	ECW Train “A” and “B” CCW Train “A” and “B” w/ “A” and “B” DCT ACCW Train “A” and “B” w/ “A” and “B” WCT HVC Train “A” and “B” HVR Train “A”, “B” and “AB”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, diesel fuel contained in the feed tank. The potential fire duration is assumed not to exceed 3 hours since the diesel oil feed tank and associated piping meet seismic Category I and Safety Class 3 design and construction criteria. This design and construction criteria, coupled with the heat dissipating capability of the liquid filled tank and piping, provide adequate protection from the radioactive and convective effects of a postulated fire until actuation of smoke detection and automatic fixed suppression or arrival of the fire brigade.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

None

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area is provided through a door (D270)located on the south wall leading to the open roof on EL. +46.00 ft msl, at Column J-1A. Door D270 is located on an exterior wall whose primary function is other than fire resistance.

b. Detection:

→(DRN 99-1018, R11)

Heat detection is provided for this fire area.

←(DRN 99-1018, R11)

c. Fire Protection:

Primary:

A pre-action automatic sprinkler system is provided for this fire area. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→ (DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

← (DRN 00-343, R11)

d. Smoke Venting:

Portable smoke ejector equipment is provided for use by the fire brigade.

RAB 16A

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to oil sump at EL. -35.00 ft msl. SUMP pumps discharge into the Turbine Building industrial waste discharge header.

VI. Analysis of Effects of Potential Fires:

In the Emergency Diesel Oil Feed Tank 'A' Space, in situ combustible materials include substantial amounts of diesel fuel oil contained in a single feed tank and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of diesel fuel oil released from the feed tank. The second type is a transient combustible exposure fire. Potential fire severity is minimized by the confinement and drainage of released combustible liquids and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic area wide suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to Diesel Oil Feed Tank "A." Safe plant shutdown can be accomplished by using Diesel Oil Feed Tank "B," and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

No specific deviations from Appendix R to 10CFR50 are requested for this area.

RAB 17

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +21.00 Ft. MSL
b. Space Name: COMPONENT COOLING WATER HEAT EXCHANGER "B"
c. Figure No.: 9.5-1-5 Approximate Coordinates: Cols, 1A-4A, K-L
d. Floor Area: 820 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “A” and “B”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “A”, “B” and “AB” w/ S/G 1 and S/G 2

←(EC-19062, R306)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump “A”

←(DRN 03-993, R13)

→(DRN 03-993, R13; EC-19062, R306)

d. Essential Electrical Support: Train “A” (EDG and Offsite), Train “B” (Offsite) and Train “AB”

←(EC-19062, R306)

e. Essential Mechanical Support: ECW Train “A”
CCW Train “A” and “AB”
ACCW Train “A” w/ “A” WCT
HVC Train “A”
HVR Train “A” and “AB”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

→(DRN 03-993, R13)

Selected essential (Safe Shutdown) raceways are provided with one-hour fire rated barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

→(EC-15965, R306)

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-. Related
East Wall	E	12x12	Yes (FD-142)		X
North Wall	S	72x48	Yes (FD-138)		X
South Wall	S	10x14	Yes (FD-139)		X
South Wall	S	72x48	Yes (FD-140)		X

←(EC-15965, R306)

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area are provided through two fire doors. One door (D42) is located on the east wall connecting to fire area RAB 23 and the other door (D30) is located on the south wall connecting to fire area RAB 16. These doors are provided with spill retention curbs. Doors D30 and D42 are provided with "A" labels.

RAB 17

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

A pre-action automatic sprinkler system is provided for this entire fire area. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific sizes and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to the waste tanks at EL. -35.00 ft msl.

VI. Analysis of Effects of Potential Fires:

In the Component Cooling Water Heat Exchanger "B" Area, in situ combustible materials include normally expected amounts of cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of cable insulation. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic area wide suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to the "B" train CCW system, the "B" and "AB" train ESCW system and the air handling unit (AH-10) for CCW pump A. Safe plant shutdown can be accomplished using "A" train shutdown equipment and CCW pump AB- The continual control of radioactive releases to the environment is maintained.

RAB 17

VII. Appendix R Deviations:

No specific deviations from Appendix R to 10CFR50 are requested for this area.

RAB 18

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +21.00 Ft. MSL
b. Space Name: COMPONENT COOLING WATER HEAT EXCHANGER "A"
c. Figure No.: 9.5.1-5 Approximate Coordinates: Cols, A1-4A, K-L
d. Floor Area: 826 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “B” and “AB”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “A”, “B” and “AB” w/ S/G 1 and S/G 2

←(EC-19062, R306)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump “B”
d. Essential Electrical Support: Train “A” (Offsite), Train “B” (EDG & Offsite) and Train “AB”
e. Essential Mechanical Support: ECW Train “B”
CCW Train “B” w/ “B” DCT
ACCW Train “B” w/ “B” WCT
HVC Train “B”
HVR Train “B” and “AB”

←(DRN 03-993, R13)

→(DRN 03-993, R13)
←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, negligible amounts of permanent combustibles. The calculated fire duration does not exceed the fire resistance of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

→(EC-15965, R306)

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
Ceiling	S	72x48	Yes (FD-176)		X
South Wall	S	72x48	Yes (FD-138)		X
East Wall	E	12x12	Yes (FD-141)		X

←(EC-15965, R306)

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area is provided through an "A" label fire door (D41) located on the east wall. This connects with fire area RAB 23.

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

A pre-action automatic sprinkler system is provided for this entire fire area. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific sizes and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→ (DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

← (DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to the waste tanks at EL. -35-00 ft msl.

VI. Analysis of Effects of Potential Fires:

In the Component Cooling Water Heat Exchanger "A" Area, in situ combustible materials include negligible amounts of permanent combustibles. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

RAB 18

A transient combustible exposure fire has been postulated for this fire area. An in situ combustible exposure fire is not considered for this area as only negligible amounts of combustibles are present. Potential fire severity is minimized by administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic area wide suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "A" train components. Safe plant shutdown can be accomplished by using "B" train shutdown equipment and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

No specific deviations from Appendix R to 10CFR50 are requested for this area.

RAB 19

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +21.00 Ft. MSL
b. Space Name: COMPONENT COOLING WATER PUMP "A"
c. Figure No.: 9.5.1-5 Approximate Coordinates: Cols, 5A, K-L
d. Floor Area: 312 sq ft

e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “B” and “AB”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “A”, “B” and “AB” w/ S/G 1 and S/G 2

←(EC-19062, R306)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump “B”
d. Essential Electrical Support: Train “A” (Offsite), Train “B” (Offsite) and Train “AB”
e. Essential Mechanical Support: ECW Train “B”
CCW Train “B” w/ “B” DCT
ACCW Train “B” w/ “B” WCT
HVC Train “B”
HVR Train “B” and “AB”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, lubricating oil. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

→(DRN 00-1778, R11-A; 03-993, R13)
←(DRN 00-1778, R11-A; 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

→(EC-15965, R306)

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
South Wall	S	8x8	Yes (FD-144)		X
South Wall	E	8x8	Yes (FD-134)		X

←(EC-15965, R306)

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area is provided through an "A" label door (D40) located on the north wall. This connects with fire area RAB 23.

→(DRN 00-1778, R11-A)
←(DRN 00-1778, R11-A)

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings. Preaction automatic sprinkler system is provided for this entire area.

RAB 19

Secondary

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are located on the General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to waste tanks at EL. -35.00 ft msl.

VI. Analysis of Effects of Potential Fires:

In the Component Cooling Water Pump "A" Area, in situ combustible materials include limited amounts of lubricating oil contained within the CCW pump. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of lubricating oil released from the CCW pump. The second type is a transient combustible exposure fire. Potential fire severity is minimized by the confinement and drainage of released combustible liquids and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, area wide automatic fire suppression, nearby hose stations, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to CCW pump A and its isolation valves and air handling unit (AH-10). Safe pl.ant shutdown equipment can be accomplished by using CCW pump B or AB. The continual control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

No specific deviations from Appendix R to 10CFR50 are requested for this area.

RAB 20

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +21.00 Ft- MSL
b. Space Name: COMPONENT COOLING WATER PUMP "AB"
c. Figure No.: 9.5.1-5 Approximate Coordinates: Cols, 6A, K-L
d. Floor Area: 312 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “A”, “B” and “AB”
b. Decay Heat Removal, Hot Shutdown: EFW Pump “A”, “B” and “AB” w/ S/G 1 and 2
c. Decay Heat Removal, Cold Shutdown: LPSI Pump “A” and “B”
d. Essential Electrical Support: Train “A” (EDG & Offsite), Train “B” (Offsite) and Train “AB”
e. Essential Mechanical Support: ECW Train “A”
CCW Train “A” and “B” w/ “A” and “B” DCT
ACCW Train “A” and “B” w/ “A” and “B” WCT
HVC Train “A” and “B”
HVR Train “A”, “B” and portions of “AB”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and lubricating oil. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

→(DRN 03-993, R13)

All vertical cable trays are provided with firebreaks at approximately 15 foot intervals.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
→(EC-15965, R306)					
South Wall	S	8x8	Yes (FD-145)		X
South Wall	E	8x8	Yes (FD-133)		X
←(EC-15965, R306)					

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress located for this fire area is provided through an "A" label fire door (D39) located on the north wall. This connects with fire area RAB 23.

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

Pre-action automatic sprinkler system is provided for this entire fire area. Portable fire extinguishers are provided in accordance with guidelines of NFPA 10. Specific sizes and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→(DRN 00-343, R11)
Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are provided in General Arrangement drawings.
←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to the waste tanks at EL. -35.00 ft msl.

VI. Analysis of Effects of Potential Fires:

In the Component Cooling Water Pump "AB" Area, in situ combustible materials include limited amounts of lubricating oil contained within the CCW pump and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

RAB 20

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or lubricating oil released from the CCW pump. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; the confinement and drainage of released combustible liquids; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic area wide suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to CCW pump AB, its isolation valves and its air handling unit (AH-20). The capability for safe plant shutdown and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

No specific deviations from Appendix R to 10CFR50 are requested for this area.

RAB 21

I. Description of Fire Area:
   a. Building: REACTOR AUXILIARY Elev: +21.00 Ft. MSL
   b. Space Name: COMPONENT COOLING WATER PUMP "B"
   c. Figure No.: 9.5.1-5 Approximate Coordinates: Cols, 7A, K-L
   d. Floor Area: 314 sq ft
   e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area
   a. RCS Inventory and Pressure Control: Charging Pump “A” and “AB”

→(EC-19062, R306)

   b. Decay Heat Removal, Hot Shutdown: EFW Pump “A” and “AB” w/ S/G 1 and S/G 2

←(EC-19062, R306)

   c. Decay Heat Removal, Cold Shutdown: LPSI Pump “A”
   d. Essential Electrical Support: Train “A” (EDG & Offsite), Train “B” (Offsite) and Train “AB”
   e. Essential Mechanical Support: ECW Train “A”
      CCW Train “A” w/ “A” DCT
      ACCW Train “A” w/ “A” WCT
      HVC Train “A”
      HVR Train “A” and “AB”

←(DRN 03-993, R13)

RAB 21

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, lubricating oil. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

→(EC-15965, R306)

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
South Wall	S	40x16	Yes (FD-129)		X
South Wall	S	8x8	Yes (FD-146)		X
South Wall	E	30x16	Yes (FD-132)		X
North Wall	E	30x16	Yes (FD-130)		X
North Wall	S	30x16	Yes (FD-147)		X
East Wall	S	20x14	Yes (FD-148)		X

←(EC-15965, R306)

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area is provided through an "A" label fire door (D38) located on the north wall. This connects with fire area RAB 23.

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→ (DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are provided on General Arrangement drawings.

← (DRN 00-343, R11)

RAB 21

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to the waste tanks, at EL. -35.00 ft msl.

VI. Analysis of Effects of Potential Fires:

In the Component Cooling Water Pump "B" Area, in situ combustible materials include limited amounts of lubricating oil contained within the CCW pump. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of lubricating oil released from the CCW pump. The second type is a transient combustible exposure fire. Potential fire severity is minimized by the confinement and drainage of released combustible liquids, and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "B" train components. Safe plant shutdown can be accomplished by using "A" train shutdown equipment and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

No specific deviations from Appendix R to 10CFR50 are requested for this area.

RAB 22

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +21.00 Ft. MSL
b. Space Name: DRUMMING STATION
c. Figure No.: 9.5.1-5 Approximate Coordinates: Cols, 1A-3A, G-H
d. Floor Area: 1,642 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

NONE

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

→(DRN 03-993, R13)

In situ combustible materials consist of, but are not limited to, cable insulation and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

←(DRN 03-993, R13)

IV. Sources of Radioactive Materials:

Contaminated disposable solids.

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
→(EC-15965, R306) East Wall ←(EC-15965, R306)	E	18x12	Yes (FD-154A)		X

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area are provided through two doors. One "A" label fire door (D217) is located on the north wall leading to fire area RAB 23 and the other is door (D28) located on the west wall leading to the truck platform, in the Solidification Building. Door D28 is located on an exterior door whose primary function is other than fire resistance.

b. Detection:

→ (DRN 99-1018, R11)

The fire area is provided with ionization smoke detectors.

← (DRN 99-1018, R11)

c. Fire Protection Systems:

Primary:

Pre-action automatic sprinklers are provided for the Drumming Station section in the northeast corner of this fire area. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→ (DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

← (DRN 00-343, R11)

d. Smoke Venting:

The nomal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage

Adequate drainage of water used for fire extinguishment will be provided by floor drains to the waste tanks at EL. -35.00 ft msl.

VI. Analysis of Effects of Potential Fires:

In the Drumming Station Area, in situ combustible materials include ordinary combustible materials and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or ordinary combustible materials. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls to limit quantities of transient and in situ ordinary combustible materials.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, no safe shutdown components would be damaged. Therefore, the capability for safe plant shutdown and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

No specific deviations from Appendix R to 10CFR50 are requested for this area.

RAB 23

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: -35.00, -4.00, +21.00 and +46.00 Ft. MSL
b. Space Name: CORRIDOR AREA & COMMON PASSAGEWAYS
c. Figure No.:9.5.1-3, 9.5.1-4, 9.5.1-5 and 9.5.1-6 Approximate Coordinates: Cols, 1A-9A, G-L
d. Floor Area: 7,239 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump "B"

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump "B" and "AB" w/ S/G 1 and S/G 2

←(EC-19062, R306)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump "B"
d. Essential Electrical Support: Train "B" (Offsite) and 480VAC Train "AB"
e. Essential Mechanical Support: ECW Train "B"
CCW Train "B" w/ "B" DCT
ACCW Train "B" w/ "B" WCT
HVC Train "B"
HVR Train "B"

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

Radioactive materials may be present in waste management piping and components, holdup tanks and boric acid concentrators.

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

→(DRN 03-993, R13)

All vertical cable trays are provided with firebreaks at approximately 15 foot intervals. Selected essential (Safe Shutdown) raceways are provided with one-hour fire rated barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
→(EC-15965, R306)					
North Wall	E	14x44	Yes (FD-151)		X
North Wall	S	62x48	Yes (FD-152)		X
West Wall	E	18x12	Yes (FD-154A)		X
North Wall	E	18x14	Yes (FD-13)	X	
North Wall	S	96x72	Yes (FD-14)	X	
Ceiling	OAI	96x72	No	X	
North Wall	S	16x10	Yes (FD-149)		X
Floor	E	18 D	Yes (FD-15)	X	
Floor	S	60x48	Yes (FD-150)		X
West Wall	S	20x14	Yes (FD-148)		X
South Wall	S	30x16	Yes (FD-147)		X
South Wall	E	30x16	Yes (FD-130)		X
North Wall	S	30x16	Yes (FD-137)		X
North Wall	E	30x16	Yes (FD-131A)		X
West Wall	E	12x12	Yes (FD-141)		X
West Wall	E	12x12	Yes (FD-142)		X
South Wall	E	8x14	Yes (FD-136)		X
Ceiling	R	12x6	Yes (FD-32)	X	
Ceiling	R	12x6	Yes (FD-33)	X	
North Wall (EL. -4.00)	E	12x12	Yes (FD-177)		X
North Wall (EL. -4.00)	E	12x12	Yes (FD-178)		X
North Wall (EL. -4.00)	E	12x12	Yes (FD-179)		X
North Wall (EL. -35.00)	E	20x20	Yes (FD-187A)		X
←(EC15965, R306)					

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area are provided through fire doors. "A" label fire doors (D220, D221 and D222) are located at EL. -4.00 ft msl and.fire doors (D217, D18, D21, D22, D25 and D29)are located at EL. +21.00 ft msl connecting to various adjacent fire areas at EL. +21.00 ft msl. 'A' label fire door AD129 located at EL. +35.00 ft msl connects to fire zone RAB 1E. There are also three "B" label fire doors, (D31, D43 and D26) leading to enclosed stairs at Columns H-3A, J-9A and J-8A which are also leading to various fire areas at different elevations. Another door located on the west wall leads to the outside area. Door D29 is provided with a letter of equivalence.

b. Detection:

Ionization smoke detectors are provided in areas of significant combustible loadings.

c. Fire Protection:

RAB 23

Primary:

A partial preaction automatic sprinkler system is provided for this fire area. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→ (DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are located on the General Arrangement drawings.

← (DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal.
Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to the waste tanks at EL. -35.00 ft msl.

VI. Analysis of Effects of Potential Fires:

In the Corridor Area and Common Passageways, in situ combustible materials include ordinary combustible materials and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or ordinary combustible materials. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls to limit quantities of transient and in situ ordinary combustible materials.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic suppression, and a trained fire brigade.

→(DRN 03-993, R13)

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, damage would be limited to "A" and "AB" train essential safe shutdown equipment, and their instrumentation and controls. Safe plant shutdown can be accomplished by using "B" train equipment. An unmitigated fire would also damage the following "B" train equipment controls: EFW control valve, and SDCS Flow Control Valve. These "B" train components can be manually operated. Therefore, the capability of the plant for safe shutdown and for control of radioactive releases to the environment is maintained.

←(DRN 03-993, R13)

RAB 23

VII. Appendix R Deviations:

a. Relief from the technical requirements of 1OCFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The need for total area wide coverage of smoke detection and automatic fixed suppression systems.

2. Separation of individual fire areas by complete 3-hour rated boundaries.

3. The existence of a 1-1/2 hour fire damper in the fire area boundary.

4. The enclosure of redundant cable tray and conduit in the same 1-hour rated fire wrap.

5. Protection of a steel maintenance hatch to a fire resistance equivalent to the fire rating of the floor boundary it forms a part of.

6. Separation of redundant diesel fuel oil piping by less than 20 feet free of intervening combustibles.

7. The existence of gap sealed walls without documented hourly fire ratings.

b. The basis for these exceptions is as follows:

1. Absence of smoke detection and automatic fixed suppression for Boric Acid/Waste Concentrator rooms, Hold Up Tank rooms, Waste Condensate Storage Tank rooms and connecting corridor:

a) No safe shutdown equipment.

→(LBDCR 14-020, R308)

b) Negligible combustible loading.

←(LBDCR 14-020, R308)

c) Rooms are separated from each other and the remainder of the fire area by discontinuous reinforced concrete walls with unrated penetrations.

d) Smoke detection and suppression of adjoining spaces.

2. Separation between fire area RAB 23 and fire area RAB 15 by a removable section in the south wall of the Diesel Generator 3BS Room (RAB 15) of a rating less than 3 hours:

→(EC-9506, R302)

a) The removable section is formed by a double wall panel assembly consisting of 4 inch thick panels separated by a 4 inch air gap. Each wall panel assembly has been fire rated by Underwriters Laboratory at 90 minutes on the EDG Room side (RAB 15) and 45 minutes on the Corridor side (RAB 23).

b) The area on both sides of the assembly is protected smoke detection and automatic fire suppression systems.

c) Adequate fire brigade and manual fire fighting equipment in the area.

←(EC-9506, R302)

RAB 23

→(EC-9506, R302)
←(EC-9506, R302)

3. Existence of a 1-1/2 hour damper (FD-15): in the fire area boundary:

   a) Detection and suppression exist on both sides of damper.

→(DRN 00-382, R11)
   b) Fire severity of areas adjacent to damper is less than the fire rating of the damper.
←(DRN 00-382, R11)

4. Enclosure of essential redundant cable tray and/or conduit in the same 1-hour wrap for the Standby Emergency Diesel Generator System:

   a) Regulatory Guide 1.75 separation criteria provides reasonable assurance that an internal tray or conduit fire will not propagate to a redundant tray or conduit.

      1) This separation between one cable tray and a redundant cable tray or conduit within the same fire wrap is accomplished by providing the subject cable tray with either a metal tray cover or a 1/2 inch blanket cover (i.e., 30 minute fire rating). Where access and spatial separation between cable trays allow, a 1-1/2 inch blanket tray cover (i.e., 1-hour fire rating) is preferred over a 1/2 inch blanket.

   b) One-hour wrap provides sufficient protection to redundant cabling until actuation of automatic suppression system or arrival of fire brigade.

5. Lack of equivalent fire resistance on floor boundary side of steel equipment hatch between fire area RAB 23 and RAB 31 located along column line J between column lines 4A and 5A.

   a) A 3-hour fire-rated protective coating is applied to the RAB 31 (ceiling) side of the equipment hatch.

   b) Protection of floor side (RAB 23) of hatch is accomplished by area wide smoke detection and automatic fixed suppression; additional modifications would be physically cumbersome to traffic flow during maintenance outages.

   c) Low probability of a flammable liquid spill in vicinity of the hatch due to strict administrative controls.

   d) There are no credible sources of ignition in the hatch vicinity.

   e) The design of the hatch is such that only limited seepage of a liquid past the hatch-to-floor fitting can occur, thus acting as a flame arrester.

RAB 23

f) Smoke detection and automatic fixed suppression coverage below the hatch provide adequate compensation for any fire hazard associated with seepage past the hatch fitting.

6. Exception from 20' separation for redundant diesel fuel oil storage and day tank piping:

   a) Subject piping is located in corridor south of diesel generator rooms (RAB 15 and 16) with a minimum separation of approximately 7 feet.

   b) Negligible combustible loading in corridor.

   c) Smoke detection and automatic fixed suppression in this corridor.

   d) Piping meets seismic Category I and Safety Class 3 design and construction criteria.

   e) Construction criteria and heat dissipating capability of Schedule 80 pipe filled with liquid provide adequate protection from radiative and convective effects of a postulated fire until actuation of smoke detection and automatic fixed suppression or arrival of the fire brigade.

7. Lack of a documented hourly fire rating based on ASTM E-119 for Stairwell Enclosure 7 at Column 3A, Stairwell Enclosure 6 at Column 8A and Stairwell Enclosure 10 at Column 8A.

   a) The interiors of the stairwell enclosures contain negligible combustible loading.

   b) For Stairwell Enclosures 6 and 10, the gap sealed walls have sprinklers and detectors on one side of the enclosure walls.

   c) For Stairwell Enclosure 7, the gap sealed walls have sprinklers and smoke detectors on one side of the north and east enclosure walls. The south enclosure wall has no sprinklers on either side; however, the adjacent corridor and Boric Acid Concentrator Rooms have a very low combustible loading and contain no essential safe shutdown equipment or cables.

RAB 23A

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: -15.00, -4.00, +21.00 and +35.00 Ft. MSL
b. Space Name: RADIOACTIVE PIPE CHASE
c. Figure No.: 9.5.1-3, 9.5.1-4, 9.5.1-5, 9.5.1-13, Dwg. G210, Dwg. G1368 and 9.5.1-21 Approximate Coordinates: Cols, 2A-6A, L
d. Floor Area: 380 sq ft
e. Zones Within the Fire Area: None

RAB 23A

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “B” and “AB”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “B” and “AB” w/ S/G 1 and S/G 2

←(EC-19062, R306)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump “B”

d. Essential Electrical Support: Train “A” (Offsite), Train “B” (EDG & Offsite) and Train “AB”

e. Essential Mechanical Support: ECW Train “B”
CCW Train “B” w/ “B” DCT
ACCW Train “B” w/ “B” WCT
HVC Train “B”
HVR Train “B” and “AB”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

Radioactive materials may be present in waste and boron management, fuel pool, blowdown, safety injection and CVCS System piping.

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

→(EC-15965, R306)

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
East Wall (+21.00 El.)	S	8” D to10x10	Yes (FD-161A)		X
North Wall (+35.00 El.)	E	10D	Yes (FD-48A)	X	
East Wall (+35.00 El.)	E	6D	Yes (FD-47A)	X	

←(EC-15965, R306)

All piping and tray penetrations are sealed.

3. Ingress and Egress:

b. Detection:

Detection is not required for this fire area.

c. Fire Protection:

Primary:

Portable fire extinguishers outside of the fire area are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use outside of this area. Specific locations of hose stations are indicated on the General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water will be provided by floor drains to the radwaste system.

VI. Analysis of Effects of Potential Fires:

In the Radioactive Pipe Chase Area, in situ combustible materials include moderate amounts of cable insulation. Transient materials are excluded from this area due to the lack of normal access.

An in situ combustible exposure fire is not considered for this area because the cables transversing this area are isolated by protective devices which operate in sufficient time to clear an electric fault before damage occurs to the cable insulation. A transient combustible exposure fire is not considered for this area because this area is completely enclosed by walls with no normal access; and therefore transients are not introduced to this area. Potential fire severity is minimized by the use of IEEE-383 cables and limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations.

Mitigating actions include portable fire extinguishers, nearby hose stations, and a trained fire brigade.

←(DRN 03-993, R13)

RAB 23A

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, damage would be limited to essential and associated cables for the "A" train Ultimate Heat Sink and Atmospheric Dump Valve for SG-2. Charging flow and pressure indication and the controls for the charging header isolation valve 2CH-FI529A/B are also impacted. Safe plant shutdown can be accomplished by using "B" train shutdown components and by manually opening the charging header isolation valve. Alternate charging flow indication is available. Therefore, the capability for safe plant shutdown and control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The need for total area wide coverage of smoke detection and automatic fixed suppression systems.

b. The basis for this exception is as follows:

1. Absence of smoke detection and automatic fixed suppression system for radioactive pipe chase room:

a) Exclusion of transient combustibles due to lack of normal access to this space.
b) Low combustible loading.
c) Cables are qualified to IEEE Standard 383. Because of this and because the area is inaccessible, if a fire were to originate in this location, the perimeter construction would be sufficient to confine the effects of the fire until it self-extinguishes. If all of the cables were damaged in such a fire, a redundant shutdown capability exists that is independent of this fire area.

RAB 24

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY - WING AREA Elev: +21.00 Ft. and +46.00 Ft. MSL
b. Space Name: DECONTAMINATION ROOM - HOT MACHINE SHOP & H&V ROOM
c. Dwg. G210 and Dwg. G1368
Approximate Coordinates: Cols, 1A-5A, L-N
d. Floor Area: 3,567 sq ft
e. Zones Within the Fire Area: None

RAB 24

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump "B" and "AB"

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump "B" and "AB" w/ S/G 1 and S/G 2

←(EC-19062, R306)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump "B"

d. Essential Electrical Support: Train "A" (Offsite), Train "B" (EDG & Offsite) and Train "AB"

e. Essential Mechanical Support: ECW Train "B"
CCW Train "B" w/ "B" DCT
ACCW Train "B" w/ "B" WCT
HVC Train "B"
HVR Train "B"

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustion materials consist of, but are not limited to, lubricating oil and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

a. Various contaminated equipment brought into this area for repair.

b. Chemical solution and water used for decontamination of equipment.

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

→(EC-15965, R306)

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
North Wall (+46)	E	48x72	No	X	
North Wall (+46)	E	72x72	No	X	
North Wall (+46)	OAI	96x72	No	X	
East Wall (+21)	E	36x8	Yes (FD-159)		X
East Wall (+21)	S	36x8	Yes (FD-160)		X

The following dampers are pinned open in the +46.00 El. floor between fire zones:

Floor/Ceiling	S	30x38	Yes (FD-164)
Floor/Ceiling	S	26x16	Yes (FD-166)
Floor/Ceiling	S	26x16	Yes (FD-165)
Floor/Ceiling	R	30x60	Yes (FD-167)
Floor/Ceiling	R	30x60	Yes (FD-163)

←(EC-15965, R306)

RAB 24

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area on EL. +21 Sq Ft MSL are provided thru two fire doors (D46 and D47). These doors are located on the north and east walls, respectively and connect to fire area RAB 25. Doors D46 and D47 are provided with letters of equivalence. Ingress and egress for this fire area on EL. +46.00 Sq Ft MSL is provided through fire door D258, located in the south wall of the hot machine shop H&V room, and connects to fire area RAB 2.

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to the laundry tanks at EL. -35.00 ft msl.

VI. Analysis of Effects of Potential Fires:

In t.he Decontamination Room - Hot Machine Shop and Hot Machine Shop H&V room, in situ combustible materials include limited amounts of lubricating oil contained in equipment and moderate amounts of ordinary combustible materials. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

RAB 24

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of lubricating oil or ordinary combustible materials. The second type is a transient combustible exposure fire. Potential fire severity is minimized by the confinement and drainage of released combustible liquids and administrative controls to limit the quantities of transient and in situ ordinary combustible materials.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would bedetected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to the "A" train SG-1 Atmospheric Dump Valve. Safe plant shutdown can be accomplished by using the SG-2 Atmospheric Dump Valve and other available shutdown equipment. The continual control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

No specific deviations from Appendix R to 10CFR50 are requested for this area.

RAB 25

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY - WING AREA Elev: +21.00 Ft. MSL
b. Space Name: EQUIPMENT ACCESS AREA
c. Dwg. G210 and Dwg. G1368
Approximate Coordinates: Cols, 2AZ-8A, L-Q
d. Floor Area: 2,525 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “B” and “AB”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “B” and “AB” w/ S/G 1 and S/G 2

←(EC-19062, R306)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump “B”
d. Essential Electrical Support: Train “A” (Offsite), Train “B” (EDG & Offsite) and Train “AB”
e. Essential Mechanical Support: ECW Train “B”
CCW Train “B” w/ “B” DCT
ACCW Train “B” w/ “B” WCT
HVC Train “B”
HVR Train “B”

←(DRN 03-993, R13)

RAB 25

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location →(EC-15965, R306)	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
West Wall	E	36x8	Yes (FD-159)		X
West Wall	S	36x8	Yes (FD-160)		X
South Wall	S	30x16	Yes (FD-131A)		X
South Wall	E	30x16	Yes (FD-137)		X
North Wall	S	16x16	Yes (FD-156)		X
North Wall	E	16x16	Yes (FD-158)		X
Floor	E	42 D*	No		X
Ceiling	E	42 D	Yes (FD-168)		X

*42 inch diameter valves located on each side of EL. +21.00 ft msl floor slab are automatically actuated by a thermal device.

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
Floor	E	14 D	Yes (FD-30A)	X	
Ceiling	E	14 D	Yes (FD-46)	X	
Floor	E	10x6	Yes (FD-217)		X
East Wall	E	8 D	Yes (FD-157)	X	
West Wall	E	8 D	Yes (FD-161A)	X	

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area are provided through four fire doors. The doors (D21) and rollup door (D22) are located on the south wall and connect to fire area RAB 23. These two doors have "A" labels. Doors (D46 and D47) are located on the north and west walls connecting to fire area RAB 24. Doors D46 and D47 are provided with letters of equivalence. Two other doors (D35 and D36) are located on the northwest wall leading outside to the cooling tower area. Doors D35 and D36 are located on exterior walls whose primary function is other than fire resistance.

b. Detection:

Ionization smoke detectors are provided in the areas of essential safe shutdown related A train cables bounded by Columns 3A-4A, M-N and by Columns 4A-8A and L-M.

c. Fire Protection:

Primary:

Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to the laundry tanks at EL. -35.00 ft msl. Pumps discharge into the waste tanks.

VI. Analysis of Effects of Potential Fires:

In the Equipment Access Area, in situ combustible materials include ordinary combustible materials and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

RAB 25

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or ordinary combustible materials. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls to limit quantities of transient and in situ ordinary combustible materials.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "A" train components. Safe plant shutdown can be accomplished using "B" train shutdown equipment and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The existence of 1-1/2 hour fire dampers in fire area boundaries.

2. Protection of a steel maintenance hatch to a fire resistance equivalent to the floor boundary it forms a part of.

3. The non-existence of fire dampers in 3-hour rated fire boundaries.

b. The basis for these exceptions is as follows:

1. Existence of the following 1-1/2 hour fire dampers in fire boundaries: FD-46 and the 42 inch diameter and 8 inch diameter fire dampers located in duct penetrations in the ceiling and wall, respectively.

a) Ionization smoke detection coverage is provided on both sides of the damper.

b) Fire severity in areas on both sides of each damper is less than the fire rating of the damper.

2. Lack of equivalent fire resistance on floor boundary side of steel equipment hatch between fire areas RAB 25 and RAB 32 located along column line 3A between column lines N and Q:

a) A 3-hour fire protective coating is provided on the RAB 32 (ceiling) side of the equipment hatch.

b) Protection of floor side of hatch would be physically cumbersome to traffic flow during maintenance outages.

c) Low probability of a flammable liquid spill in vicinity of hatch due to strict administrative controls.

RAB 25

d) There are no credible sources of ignition in the hatch vicinity.

e) The design of the hatch is such that only limited seepage of a liquid past the hatch-to-floor fitting can occur, thus acting as a flame arrester.

f) Smoke detection coverage above and below the hatch provides adequate compensation for any fire hazard associated with seepage past the hatch fitting. In the event a fire does occur, prompt detection and suppression by the fire brigade is expected before any damage is caused to safety shutdown equipment (located away from the immediate hatch vicinity).

3. Absence of fire dampers in the duct penetrations separating RAB 25 from RAB 24. The duct penetrations are located in the west wall (Duct size - 38" x 30") and the floor (one penetration is a size 48" x 24" duct and two are size 36" x 18" Ducts).

a) Ionization smoke detection coverage is provided on both sides of each penetration.

b) Fire severity in adjacent area is negligible.

c) Presence of portable fire extinguishers and standpipe hose stations.

d) Adjacent area (RAB 24) contains no essential safe shutdown equipment.

RAB 27

I. Description of Fire Area

→(DRN 99-2476, R11)

a. Building: REACTOR AUXILIARY Elev: +7.00 Ft MSL
b. Space Name: MECHANICAL-ELECTRICAL, HVAC EQUIPMENT & ADMINISTRATIVE ENVELOPE
c. Figure No.: 9.5.1-10 Approximate Coordinates: Cols, 8A-12A, G-L
d. Floor Area: 7,503 sq ft
e. Subspaces Within the Fire Area: Communications Equipment Room (371 sq ft)
I&C Room (442 sq ft)
HVAC Equipment Room (1,683 sq ft)

←(DRN 99-2476, R11)

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “B”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “B” w/ S/G 1 and S/G 2

←(EC-19062, R306)

c. Decay Heat Removal, Cold Shutdown: LPSI Pump “B”
d. Essential Electrical Support: Train “B” (EDG & Offsite) and 480VAC Train “AB”

←(DRN 03-993, R13)

→(DRN 03-993, R13)

e. Essential Mechanical Support:

ECW Train "B"
CCW Train "B" w/ "B" DCT
ACCW Train "B" and "AB" w/ "B" WCT
HVC Train "B"
HVR Train "B"

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings

In situ combustible materials consist of, but are not limited to, cable insulation and ordinary combustible material. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

A 3-hour fire boundary is provided for the envelope perimeter.

→(DRN 03-993, R13)

All vertical cable trays are provided with firebreaks at approximately 15 foot intervals. Selected essential (Safe Shutdown) raceways are provided with one-hour fire rated barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
→(EC-15965, R306)					
East Wall	S	22x24	Yes (FD-123)		X
East Wall	OAI	10x52	Yes (FD-124)		X
East Wall	OAI	48x20	Yes (FD-122)		X
East Wall	E	16x14	Yes (FD-125)		X
Ceiling	R	46x18	Yes (FD-16)	X	
Ceiling	R	46x18	Yes (FD-17)	X	
West Wall	S	24x24	Yes (FD-117)		X
Ceiling	S	16D	Yes (FD-29)	X	
Ceiling	S	16D	Yes (FD-25)	X	
Ceiling	S	16D	Yes (FD-26)	X	
Ceiling	S	16D	Yes (FD-27)	X	
Ceiling	S	16D	Yes (FD-28)	X	
Floor	S	8x6	Yes (FD-215)		X
←(EC-15965, R306)					

All piping and tray penetrations are sealed.

3. Ingress and Egress

Ingress and egress for this fire area are provided through two "B" label fire doors (DIOl and D107) to enclosed stairs at columns K-12A and J-11A. These stairs lead to fire zone RAC 8C at El. 21 ft. and fire area RAB 30 at El.-4 ft. In addition, an access door, AD101, located on the east wall leads to fire area RAB 3A.

b. Detection:

Ionization smoke detectors are provided for this fire area, including pipe chase and cable riser shaft.

c. Fire Protection:

Primary:

A pre-action automatic sprinkler system is provided for this entire fire area, including the area above the drop ceiling. No sprinkler protection is provided for the communications equipment subspace. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→ (DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this zone. Specific locations of hose stations are indicated on General Arrangement drawings.

← (DRN 00-343, R11)

d. Smoke Venting:

Except for the HVAC Equipment subspace, the Normal Ventilation System may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to the Sanitary Drainage System. The I&C subspace and Communications Equipment subspace are provided with drainage by opening doors to utilize the drainage system of adjacent areas.

VI. Analysis of Effects of Potential Fires:

In this area, in situ combustible materials include moderate amounts of cable insulation and ordinary combustible materials. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

RAB 27

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of cable insulation or ordinary combustible materials. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, partial area suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "A" and "AB" shut down equipment. Safe plant shutdown can be accomplished by using "B" train shutdown equipment and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this zone, specifically:

1. The enclosure of redundant cable tray and conduit in the same 1-hour fire wrap.

2. The existence of a 1-1/2 hour fire damper in fire are boundaries.

3. The existence of gap sealed walls without a documented hourly fire rating.

4. The need for total area wide coverage of automatic fixed suppression systems.

b. The basis for these exceptions are as follows:

1. Enclosure of essential redundant cable tray and/or conduit in the same 1-hour wrap for the following systems:

- Standby Emergency Diesel Generator System

- Chemical and Volume Control System

- Switchgear Area and Cable Vault Ventilation System

- Pressurizer Heater Bank

a) Reg. Guide 1.75 separation criteria provides reasonable assurance that an internal tray or conduit fire will not propagate to a redundant tray or conduit.

1) This separation between one cable tray and a redundant cable tray or conduit within the same fire wrap is accomplished by providing the subject cable tray with either a metal tray cover or a 1/2 inch blanket cover (i.e., 30 minute fire rating). Where access and spatial separation between cable trays allow, a 1-1/2 inch blanket tray cover (i.e., 1-hour fire rating) is preferred over a 1/2 inch blanket.

RAB 27

b) One-hour wrap provides sufficient protection to redundant cabling until actuation of automatic suppression system or arrival of fire brigade.

2. Existence of the following 1-1/2 fire dampers: FD-25, FD-26, FD-27, FD-28, and FD-29.
   a) Detection and suppression exist on both sides of the damper
   b) Fire severity in adjacent areas less than the fire rating of the dampers.

3. Lack of a documented hourly fire rating based on ASTM E-119 for Stairwell Enclosure 5 at Column J-12A.
   a) The gap sealed walls have sprinklers and detectors on one side of the perimeter enclosure walls.
   b) The interior of the elevator shaft/stairwell has a low combustible load.

4. Absence of automatic fixed suppression for the Communications Equipment subspace.

   a) No safe shutdown equipment

→(DRN 03-993, R13)

   b) Smoke detection and automatic fixed suppression in adjoining areas will check propagation of fire, if necessary, until arrival of the fire brigade.

←(DRN 03-993, R13)

   c) Low combustible loading.

   d) Smoke detection provided.

RAB 30

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: -4.00 Ft. MSL
b. Space Name: ADMINISTRAT10N AREA (HEALTH PHYSICS)
c. Figure No.: 9.5.1-4 Approximate Coordinates: Cols, 8A-12A, G-L
d. Floor Area: 7,064 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “A”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A” and “AB” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “A”
d.	Essential Electrical Support:	Train “A”, “B” and “AB”
e.	Essential Mechanical Support:	ECW Train “A” and “B”
		CCW Train “A” and “B” w/ “A” and “B” DCT
		ACCW Train “A” and “B” w/ “A” and “B” WCT
		HVC Train “A” and “B”
		HVR Train “A”, “B” and “AB”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

Limited amounts of radioactive materials may be present in the Health Physics and the personnel decontamination areas.

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

→(DRN 99-2127, R11)

All vertical cable trays are provided with firebreaks at approximately 15 foot intervals. Essential “A” train conduits required for safe shutdown are protected with three-hour fire rated barriers.

←(DRN 99-2127, R11)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
→(EC-15965, R306)					
West Wall	E	32x12	Yes (FD-109)		X
North Wall	E	30x16	Yes (FD-112)		X
North Wall	S	34x12	Yes (FD-113)		X
North Wall	S	14x16	Yes (FD-114)		X
North Wall	S	30x14	Yes (FD-115)		X
North Wall	E	28x12	Yes (FD-116)		X
Ceiling	S	44x12	Yes (FD-186)		X
West Wall	E	28x18	Yes (FD-110)		X
Ceiling	E	8x6	Yes (FD-215)		X
West Wall	R	36x36	Yes (FD-111)		X
←(EC-15965, R306)					

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area are provided through eight fire doors. Six doors (D141, D142, D143, D144, D150 and D151) are located on the west and north walls and connect with fire area RAB 31. Two "B" label doors (D131 and D136) lead to enclosed stairways at Columns K-12A and J-12A connecting fire areas at different elevations.

b. Detection:

Ionization smoke detectors are provided in areas of significant combustible loadings.

c. Fire Protection:

Primary:

An automatic wet pipe sprinkler system is provided in areas expected to contain significant ordinary combustible materials. Portable fire extinguishers are also provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to the waste tanks.

VI. Analysis of Effects of Potential Fires:

In the Administration Area (Health Physics), in situ combustible materials include moderate amounts of ordinary combustible materials and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or ordinary combustible materials. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls to limit the quantities of transient and in situ ordinary combustible materials.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic suppression, and a trained fire brigade.

RAB 30

→ (DRN 99-2127, R11)

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, damage would be limited to essential and associated cabling for "B" train safe shutdown components. Safe plant shutdown can be accomplished by using redundant "A" train safe shutdown components whose cabling is located in the same fire area, but isolated by a three-hour fire rated barrier. Cables for CCW valves from SDHX SA and SB are separated by 8'0, however, these cold shutdown related valves Fail Open and can be operated manually. The capability of the plant for safe shutdown and for control of radioactive releases to the environment is maintained.

← (DRN 99-2127, R11)

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The existence of gap sealed walls without a documented hourly fire rating.

b. The basis for this exception is as follows:

1. Lack of a documented hourly fire rating based on ASTM E-119 for Stairwell Enclosure 5 at Column 12A/J.

a) Gap sealed walls have sprinklers and smoke detectors on one side of the south enclosure wall, and smoke detectors on one side of the north enclosure wall. The west and north enclosure walls have no sprinklers on either side, however, the corridor and office have limited combustible load.

b) Essential equipment in the area consists of "A" and "B" train electrical cable risers which are located over 120 feet apart.

c) The interior of the stairwell enclosure contains negligible combustibles.

RAB 31

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: -4.00 Ft. MSL
b. Space Name: CORRIDOR & PASSAGEWAYS
c. Figure No.: 9.5.1-4 Approximate Coordinates: Cols, 1A-10A, G-L
d. Floor Area: 10,997 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump "B"

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump "B" w/ S/G 1 and S/G 2

c. Decay Heat Removal, Cold Shutdown: LPSI Pump "B"

d. Essential Electrical Support: Train "A" (Offsite), Train "B" (EDG & Offsite) and "AB"

←(EC-19062, R306)

e. Essential Mechanical Support: ECW Train "B"
CCW Train "B" w/ "B" DCT
ACCW Train "B" w/ "B" WCT
HVC Train "B"
HVR Train "B"

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation, lubricating oil and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

Radioactive materials are present in the process piping of various equipment located within this fire area. Combustible loading in the area of such equipment is negligible. Therefore, direct flame impingement and subsequent release of radioactive materials is not postulated.

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

→(DRN 03-993, R13)

All vertical cable trays are provided with firebreaks at approximately 15 foot intervals. Selected essential (Safe Shutdown) raceways are provided with one-hour fire rated barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis.

←(DRN 03-993, R13)

RAB 31

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
→(EC-15965, R306)					
East Wall	E	32x12	Yes (FD-109)		X
South Wall	E	30x16	Yes (FD-112)		X
South Wall	S	34x12	Yes (FD-113)		X
South Wall	S	16x14	Yes (FD-114)		X
South Wall	E	28x12	Yes (FD-116)		X
South Wall	S	30x14	Yes (FD-115)		X
East Wall	E	28x14	Yes (FD-110)		X
East Wall(EL.15'-O)	S	24x24	Yes (FD-117)		X
Floor	E	18 D	Yes (FD-12)	X	
Ceiling	E	18 D	Yes (FD-15)	X	
Floor	S	60x40	Yes (FD-108)		X
Ceiling	S	60x48	Yes (FD-150)		X
East Wall	R	36x36	Yes (FD-111)		X
East Wall	E	14x16	Yes (FD-107A)		X
Floor	E	36x36	Yes (FD-106)		X
Ceiling	E	64x44	Yes (FD-155)		X
North Wall	E	30 D	Yes (FD-105A)		X
South Wall	E	12x12	Yes (FD-177)		X
South Wall	E	12x12	Yes (FD-178)		X
South Wall	E	12x12	Yes (FD-179)		X
←(EC-15965, R306)					

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area are provided through seven fire doors (D141, D142, D143, D144, D150, D151 and D161) connecting to various fire areas. There are also two "B" label fire doors (D146 and D149) that lead to enclosed stairways at Columns J-9 and J-3A connecting to various fire areas at different elevations. Doors D142, D143, D144, D150 and D151 are provided with "A" labels. Doors D141 and D161 are provided with letters of equivalence.

b. Detection:

Ionization smoke detectors are provided in areas of significant combustible loadings.

c. Fire Protection:

Primary:

A partial preaction automatic sprinkler system is provided for this fire area. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

RAB 31

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal.
Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to the Waste Tanks.

VI. Analysis of Effects of Potential Fires:

In the Corridor and Passageways Area, in situ combustible materials include moderate amounts of lubricating oil contained within equipment, ordinary combustible materials, and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation, lubricating oil released from the equipment or ordinary combustible materials. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; the confinement and drainage of released combustible materials; and administrative controls to limit quantities of transient and in situ ordinary combustible materials.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic suppression, and a trained fire brigade.

→(DRN 03-993, R13)

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "A" train components.

←(DRN 03-993, R13)

Safe plant shutdown can be accomplished using "B" train shutdown equipment and the control of radioactive materials is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 1OCFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The need for total area wide coverage of smoke detection and automatic fixed suppression systems.
2. The existence of 1-1/2 hour fire dampers in 3-hour rated fire boundaries.
3. Protection of steel maintenance hatch to a fire resistance equivalent to the floor boundary it forms a part of.
4. The existence of gap sealed walls without a documented hourly fire rating.

b. The basis for these exceptions is as follows:

→(EC-18667, R304)

1. Absence of smoke detection and automatic fixed suppression for pipe chase, Fuel Pool Filter Room, CVCS rooms and Blowdown HX rooms to the west of column line 6A and between column lines K & L:

←(EC-18667, R304)

   a) Rooms are separated from remainder of fire area by discontinuous reinforced concrete walls with wire mesh doors.

   b) No safe shutdown equipment.

   c) Low combustible loading.

   d) Presence of smoke detection and automatic fixed suppression in spaces adjacent to these rooms.

2. The existence of the following 1-1/2 hour rated fire dampers in fire area boundaries: FD-12, FD-15 and the fire damper located in the 30 inch diameter duct penetration in the north wall.

   a) Detection and suppression exist on both sides of each damper.

   b) Fire severity of adjacent areas is less than the fire rating of each damper.

3. Lack of equivalent fire resistance on floor boundary side of steel equipment hatch between fire areas RAB 31 and RAB 39 located along column line J between column lines 4A and 5A:

   a) A 3-hour fire protective coating has been applied to the RAB 39 (ceiling) side of the equipment hatch.

   b) Protection of floor side (RAB 31) of hatch would be physically cumbersome to traffic flow during maintenance outages.

   c) Low probability of a flammable liquid spill in the vicinity of the hatch due to strict administrative controls.

   d) There are no credible sources of ignition in the hatch vicinity.

   e) The design of the hatch is such that only limited seepage of a liquid past the hatch-to-floor fitting can occur, thus acting as a flame arrester.

RAB 31

f) Smoke detection coverage above and below the hatch provides adequate compensation for any fire hazard associated with seepage past the hatch fitting.

4. Lack of a documented hourly fire rating based on ASTM E-119 for Stairwell Enclosure 7 at Column 3A, Elevator Shaft C at Column 6A and Stairwell Enclosure 6 at Column 8A.

→(LBDCR 14-020, R308)

a) Interior of the stairwells contains negligible combustibles. Interior at the elevator shaft has a low combustible load.

←(LBDCR 14-020, R308)

b) The gap sealed walls at Elevator Shaft C and Stairwell Enclosure 6 have sprinklers and smoke detectors on one side of the enclosure walls. The same is true for Stairwell Enclosure 7 with the exception of a portion of the west wall and a common area is adjacent to the area which contains ion exchanger vessels with essential equipment, or essential cables, and is considered to have a low combustible loading.

RAB 32

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY-WING AREA Elev: -35.00 and -4.00 Ft. MSL
b. Space Name: PIPE PENETRATIONS; AUXILIARY COMPONENT COOLING WATER PUMPS
c. Figure No.: 9.5.1-13 Approximate Coordinates: Cols, 2AZ-11AZ, L-N
d. Floor Area: 15,715 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “A” (or “B”, depending on effect of fire in RAB 32) and “AB”
→(EC-19062, R306) b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A” (or “B”, depending on effect of fire in RAB 32) and “AB” w/ S/G 1 and S/G 2
←(EC-19062, R306) c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “A” (or “B”, depending on effect of fire in RAB 32)
d.	Essential Electrical Support:	Train “A” (Offsite), Train “B” (Offsite) and “AB”
e.	Essential Mechanical Support:	ECW Train “A” (or “B”, depending on effect of fire in RAB 32) CCW Train “A” w/ “A” DCT (or Train “B” w/ “B” DCT, depending on effect of fire in RAB 32) ACCW Train “A” w/ “A” WCT (or Train “B” w/ “B” WCT depending on effect of fire in RAB 32) HVC Train “A” (or “B”, depending on effect of fire in RAB 32) HVR Train “A” (or “B”, depending on effect of fire in RAB 32) and “AB”

←(DRN 03-993, R13)

RAB 32

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation, lubricating oil, and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

→(DRN 03-993, R13)

All vertical cable trays are provided with firebreaks at approximately 15 foot intervals.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
→(EC-15965, R306)					
South Wall (El. -4.00)	S	30 D	Yes (FD-105A)		X
Ceiling	E	18 D	Yes (FD-31A)	X	
Ceiling	E	14 D	Yes (FD-30A)	X	
Ceiling	E	42 D*	No	X	
South Wall	E/S	30 D	Yes (FD-6)	X	
South Wall	E	16 D	Yes (FD-7A)	X	
South Wall	E	16 D	Yes (FD-8A)	X	
South Wall	E	12 D	Yes (FD-9A)	X	
South Wall	E	16 D	Yes (FD-10)	X	
Ceiling	E	10x6	Yes (FD-217)		
West Wall	E	10x6	Yes (FD-218)		
←(EC-15965, R306)					

*42" diameter valves located on,each side of EL. +21.00 ft msl ceiling slab are automatically actuated by a thermal device. In addition, the piping between the valves is protected against fire.

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for the fire area are provided through a fire door (DI61) located at EL. -4.00 ft msl in the south wall leading to fire area RAB 31. Ingress and egress is also provided from EL. +4.00 ft msl, through a Personnel Lock (center line located at EL. +11.00 ft msl and 18 degrees east of Column 7A) leading to the Reactor Containment Building. Door D161 is provided with a letter of equivalence.

b. Detection:

Ionization smoke detectors are provided throughout the fire area.

c. Fire Protection:

Primary:

A partial automatic wet pipe sprinkler system is provided at EL. -35.00 ft msl of this fire area only. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→ (DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

← (DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system will be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to sumps No. 3 and 4 at EL. -35.00 ft msl. The pumps discharge into the Waste Tanks.

VI. Analysis of Effects of Potential Fires:

In the Pipe Penetrations, Auxiliary Component Cooling Water Pumps Area, in situ combustible materials include moderate amounts of lubricating oil contained within equipment, ordinary combustible materials, and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation, lubrication oil released from the equipment or ordinary combustible materials. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; the confinement and drainage of released combustible liquids; and administrative controls to limit quantities of transient and in situ ordinary combustible materials.

RAB 32

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, damage would be limited to "B" train safe shutdown components. Safe plant shutdown can be accomplished using "A" and "AB" train shutdown equipment with manual operation of the atmospheric dump valves, SDCS isolation valves, and the charging header discharge valve. The continual control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The need for total area wide coverage of automatic fixed suppression systems.

2. The existence of 1-1/2 hour fire dampers in the fire area boundaries.

b. The basis for these exceptions is as follows:

1. Absence of automatic fixed suppression other than area bounded by column lines L, M, 2AZ and 11AZ at EL. -35.00 ft:

a) Redundant Auxiliary CCW Pumps (hot shutdown) are separated by 172 feet (horizontally) and the southern portion of the containment wall.

b) Redundant Instrument Cabinets C-11A and C-11B are separated by 192 feet (horizontally) and the southern portion of the containment wall.

→(DRN 03-993, R13)

c) Deleted

←(DRN 03-993, R13)

d) Redundant Safety Injection System valves located within this area are required for cold shutdown only and are provided with manual override capabilities should fire impact the valve operator or assigned cable.

2. The existence of the following 1-1/2 hour rated fire dampers in fire area boundaries: FD-6 and FD-10, and the fire damper in the 30 inch diameter duct located in the south wall.

a) Detection exists on both sides of each damper.

b) Fire severity in adjacent areas less than the fire rating of the damper.

RAB 33

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: -35.00 Ft. MSL
b. Space Name: SHUTDOWN COOLING HEAT EXCHANGER "A" and "B"
c. Figure No.: 9.5.1-3 Approximate Coordinates: Cols, 1OA-12A, J-L
d. Floor Area: 3,315 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “A” and “AB”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A” and “AB” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “A”
d.	Essential Electrical Support:	Train “A” (EDG & Offsite), Train “B” (EDG & Offsite) and Train “AB”
e.	Essential Mechanical Support:	ECW Train “A”, “B” and “AB” CCW Train “A”, “B” and “AB” w “A” and “B” DCT ACCW Train “A” and “B” w/ “A” and “B” WCT HVC Train “A” and “B” HVR Train “A” and “B”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

Radioactive materials may be present in the heat exchangers. Due to spatial separation between combustible material and the heat exchangers, flame impingement on the equipment is not postulated. Radioactive release to the area due to a fire will not occur.

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

→(DRN 03-993, R13)
←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

RAB 33

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
North Wall →(EC-15965, R306)	E/S	16 D	Yes (FD-10)	X	
South Wall ←(EC-15965, R306)	S	16 D	Yes (FD-5)	X	

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area are provided through three fire doors. Two doors (DI67 and D242) are located on the south wall and connect to the common corridor in fire area RAB 39. A third door (D250) is located on the west wall and connects to fire area RAB 35. Door D167 is provided with a letter of equivalence. Door D242 is provided with an "A" label.

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

A pre-action automatic sprinkler system is provided for this entire fire area. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on the General Arrangement drawings.

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are located on the General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to sump at EL. -35.00 ft msl. The pumps discharge into the waste tanks.

RAB 33

VI. Analysis of Effects of Potential Fires:

In the Shutdown Cooling Heat Exchanger "A" and "B" Area, in situ combustible materials include moderate amounts of cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of cable insulation. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic area wide suppression, and a trained fire brigade.

→(DRN 03-993, R13)

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, adequate spatial separation and fire barriers exist such that the loss of safe shutdown components would be limited to the "B" train EFW pump, charging pump “B”, LPSI pump “B”, and either the "A" train SDCS equipment or the "B" train SDCS equipment. The capability for safe plant shutdown and the control of radioactive releases to the environment is maintained.

←(DRN 03-993, R13)

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The need for a complete 1-hour barrier between redundant safe shutdown equipment.

2. The existence of 1-1/2 hour fire dampers in the fire area boundaries.

3. The need for total area wide coverage of automatic fixed suppression systems.

b. The basis for these exceptions is as follows:

1. Part height wall separating the following safe shutdown equipment.

- Shutdown Cooling Heat Exchangers A & B

→(EC-18551, R304)

a) Automatic detection and suppression provided over all redundant safe shutdown equipment in the area.

b) Wall constitutes a complete 1-hour separation (including doors and penetrations) up to the height of the wail.

c) Low fire load in the fire area.

d) Administrative controls and low traffic volume limit the introduction of significant amounts of combustible materials.

e) Portable fire extinguishers and inside standpipe hose connections are provided for use by the trained fire brigade for manual fire fighting.

←(EC-18551, R304)

RAB 33

→(EC-18551, R304)

f) Construction and location of the partial-height fire barrier provides adequate protection from the radiative effects of a fire postulated on either side. The area containing the partial-height barrier is a large volume room with ceiling heights approximately 33 feet and construction is reinforced concrete. Therefore, a hot gas layer forming in the ceiling is not creditable based on type construction and large volume area. These attributes (construction and location of partial-height fire barrier, building construction and large volume area & automatic suppression) are considered adequate for combustible fire loads up to 1-hour which is considered a low fire loading. This ensures that a fire on either side of the partial-height barrier will not damage redundant safe shutdown components on the other side.

←(EC-18551, R304)

2. The existence of the following 1-1/2 hour rated fire dampers in fire area boundaries: FD-5 and YD-10.

   a) Detection and suppression exists on both sides of each damper.

   b) Adjacent area fire severity is less than the fire rating of each damper.

3. The need for automatic fixed suppression coverage for the enclosed cubicles within RAB-33 housing redundant Instrumentation Cabinets C-27A and C-27B:

   a) Cubicles are completely enclosed and are divided by full height reinforced concrete wall and Class A or equivalent fire doors.

   b) Smoke detection provided.

   c) One-hour wrap, smoke detection and automatic fixed suppression coverage outside of these entryway cubicles.

RAB 34

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: -15.50 Ft. MSL
b. Space Name: VALVE GALLERIES
c. Figure No.: 9.5.1-3 Approximate Coordinates: Cols 9A-10A, J-L
d. Floor Area: 1,272 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “B” and “AB”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A” and “AB” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “B”
d.	Essential Electrical Support:	Train “A” (EDG & Offsite), Train “B” (EDG & Offsite) and Train “AB”
e.	Essential Mechanical Support:	ECW Train “A”, “B” and “AB” CCW Train “A”, “B” and “AB” w/ “A” and “B” DCT ACCW Train “A” and “B” w/ “A” and “B” WCT HVC Train “A” and “B” HVR Train “A”, “B” and “AB”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, negligible amounts of permanent combustibles. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

Radioactive materials are present during normal operations. Due to the negligible quantity of combustibles, flame impingement on equipment is not postulated.

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

→(DRN 03-993, R13)

Selected essential (Safe Shutdown) raceways are provided with one-hour fire rated barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
North Wall	E	12 D	Yes (FD-9A)	X	
South Wall	S/E	12 D	Yes (FD-4A)	X	

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area are provided through a fire door (DI63) located on the south wall leading into fire area RAB 39. Door D163 is provided with a letter of equivalence.

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

Portable fire extinguishers are provided in accordance with guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to sump at EL. -35.00 ft msl. Pumps discharge into the waste tanks.

VI. Analysis of Effects of Potential Fires:

In the Valve Galleries Area, in situ combustible materials include negligible amounts of permanent combustibles. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

RAB 34

A transient combustible exposure fire has been postulated for this fire area. An in situ combustible exposure fire is not considered for this area as only negligible amounts of combustibles are present. Potential fire severity is minimized by administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "B" train EFW pump and SDCS flow indicator, the "A" train LPSI pump, and both "A" and "B" SDCS bypass valves. Safe plant shutdown can be accomplished using "B" train shutdown equipment with manual operation of the SDCS bypass valve. Feedwater can be supplied to the steam generators by either the "A" train EFW pump or the steam turbine-driven emergency feed pump. The continual control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The need for an automatic fixed suppression system.

b. The basis for these exceptions is as follows:

1. Absence of an automatic fixed suppression system:

a) Train B cable/conduit assigned to LPSI pump "B" and the SDCS train "B" temperature element are provided with 1-hour rated fire wrap.

b) Presence of 1-hour wrap and detection.

c) Cable/conduit assigned to Shutdown Cooling System (SDCS) valving (cold shutdown only) can be lost without adverse impact on the capability of safety shutdown. The SDCS valves are located outside RAB 34 (i.e., RAB 35 and 36) while their handwheels are located inside RAB 34 should manual operation become necessary.

RAB 35

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: -35.00 Ft. MSL
b. Space Name: SAFETY INJECTION PUMP AREA "B"
c. Figure No.: 9.5.1-3 Approximate Coordinates: Cols, 6A-10A, K-L
d. Floor Area: 2,568 sq ft
e. Zones Within the Fire Area: None

RAB 35

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump "A" and "AB"

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump "A" and "AB" w/ S/G 1 and S/G 2
c. Decay Heat Removal, Cold Shutdown: LPSI Pump "A"
d. Essential Electrical Support: Train "A" (EDG & Offsite), Train "B" (EDG & Offsite) and Train "AB"
e. Essential Mechanical Support: ECW Train "A" and Train "B"
CCW Train "A" w/ "A" DCT and Train "B" w/"B" DCT
ACCW Train "A" w "A" WCT and Train "B" w/"B" WCT
HVC Train "A" and Train "B"
HVR Train "A" and Train "B"

←(DRN 03-993, R13; EC-19062, R306)

→(DRN 03-993, R13)
←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and lubricating oil. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

Radioactive materials are present within process piping.

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
North Wall	E	16 D	Yes (FD-7A)	X	
South Wall	E	28x12	Yes (FD-2)	X	
North Wall	E/SV	16 D	Yes (FD-8A)	X	
West Wall	S	16 D	Yes (FD-1)	X	

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area is provided through one fire door (D250) located on the east wall and connects to fire area RAB 33. Door D250 is provided with a letter of equivalence.

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

Portable fire extinguishers are provided in accordance with NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are located on the General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided. Sump pumps discharge into the waste tanks.

VI. Analysis of Effects of Potential Fires:

In the Safety Injection Pump Area 'B,' in situ combustible materials include limited amounts of lubricating oil and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or lubricating oil released from the equipment. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; the confinement and drainage of released combustible liquids; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, and a trained fire brigade.

RAB 35

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "B" train equipment, safe plant shutdown can be accomplished using "A" train shutdown equipment and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 1OCFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The existence of 1-1/2 hour fire dampers in the fire area boundaries.

b. The basis for this exception is as follows:

1. Existence of the following 1-1/2 hour fire damper in the fire area boundary: FD-1.

a) Ionization smoke detection coverage is provided on both sides of the damper.

b) Fire severity in adjacent areas is less than the fire rating of the damper.

c) Presence of portable fire extinguishers and standpipe hose stations.

d) Administrative controls and low traffic volume limit the introduction of significant amounts of combustible materials.

e) Ventilation exhaust system has sufficient capacity to allow adequate accessibility for damage control.

f) Low combustible loading.

RAB 36

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: -35.00 Ft. MSL
b. Space Name: SAFETY INJECTION PUMP AREA "A"
c. Figure No.: 9.5.1-3 Approximate Coordinates: Cols, 6A-10A, J-K
d. Floor Area: 2,556 sq ft
e. Zones Within the Fire Area: None

RAB 36

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “B” and “AB”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A”, “B” and “AB” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “B”
d.	Essential Electrical Support:	Train “A” (EDG & Offsite), Train “B” (EDG & Offsite) and Train “AB”
e.	Essential Mechanical Support:	ECW Train “A” and “B” CCW Train “A” and “B” w/ “A” and “B” DCT ACCW Train “A” and “B” w/ “A” and “B” WCT HVC Train “B” HVR Train “B” and “AB”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and lubricating oil. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

Radioactive materials are present within process piping.

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design is 3 hours.

→(DRN 03-993, R13)

Selected essential (Safe Shutdown) raceways are provided with one-hour fire rated barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
South Wall	S	16 D	Yes (FD-3A)	X	
North Wall	E/SV	28x12	Yes (FD-2)	X	

→(EC-15965, R306)

←(EC-15965, R306)

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area is provided through one fire door (D170) located on the south wall and connects to the common corridor in fire area RAB 39.

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

Portable extinguishers are provided in accordance with NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→ (DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are located on the General Arrangement drawings.

← (DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided. Sump pumps discharge into the waste tanks.

VI. Analysis of Effects of Potential Fires:

In the Safety Injection Pump Area 'A,' in situ combustible materials include limited amounts of lubricating oil and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or lubricating oil released from the equipment. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; the confinement and drainage of released combustible liquids; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, and a trained fire brigade.

RAB 36

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "A" train equipment and Safeguard Pump Room B Cooler AH-2 (3B-SB). Safe plant shutdown can be accomplished with "B" train shutdown components and AH-2 (3D-SB). The continual control of radioactive releases to the envirorunent is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The need to provide an automatic fixed suppression system.

b. The basis for these exceptions is:

1. Absence of an automatic fixed suppression for this fire area:

a) Essential train B safe shutdown conduits assigned to the Safeguard Pump Room B Cooler AH-2 (3D-SB) are provided with 1-hour rated fire wrap throughout the fire area.

b) Presence of 1-hour wrap and detection will provide sufficient protection to at least one redundant safe shutdown train until arrival of the fire brigade.

RAB 37

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: -35.00 Ft. MSL

→(DRN 06-874, R15)

b. Space Name: EMERGENCY FEEDWATER PUMP "A"

←(DRN 06-874, R15)

c. Figure No.: 9.5.1-3 Approximate Coordinates: Cols, 5A-6A, J-K

d. Floor Area: 291 sq ft

e. Zones Within the Fire Area: None

RAB 37

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “B” and “AB”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “B” and “AB” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “B”
d.	Essential Electrical Support:	Train “A” (Offsite), Train “B” (EDG & Offsite) and Train “AB”
e.	Essential Mechanical Support:	ECW Train “B” and “AB” CCW Train “B” w/ “B” DCT ACCW Train “B” w/ “B” WCT HVC Train “B” HVR Train “B” and “AB”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and lubricating oil. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

→(DRN 03-993, R13)

Selected essential (Safe Shutdown) raceways are provided with one-hour fire rated barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

→(EC-15965, R306)

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
West Wall	S	12x10	Yes (FD-102)		X
South Wall	E	12x12	Yes (FD-101)		X

←(EC-15965, R306)

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area is provided through an "A" label fire door (D246) located on the west wall which connects to the common corridor in fire area RAB 39.

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

A pre-action automatic sprinkler system is provided for this entire fire area. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on the General Arrangement drawings.

Secondary:

→ (DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on the General Arrangement drawings.

← (DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to floor drain sump No. 8 at EL. -35.00 ft msl. Sump pumps discharge into the waste tanks.

VI. Analysis of Effects of Potential Fires:

→(DRN 06-874, R15)

In the Emergency Feedwater Pump "A" Area, in situ combustible materials include limited quantities of lubricating oil and substantial amounts of cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

←(DRN 06-874, R15)

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation or lubricating oil released from the equipment. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; the confinement and drainage of released combustible liquids; and administrative controls of transient combustibles.

RAB 37

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic area wide suppression, and a trained fire brigade.

→(DRN 03-993, R13)

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "A" train equipment. Safe plant shutdown can be accomplished using "B" train components and the control of radioactive releases to the environment is maintained.

←(DRN 03-993, R13)

VII. Appendix R Deviations:

No specific deviations from Appendix R to 1OCFR50 are requested for this area.

RAB 38

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: -35.00 Ft. MSL

→(DRN 06-874, R15)

b. Space Name: EMERGENCY FEEDWATER PUMP "B"

←(DRN 06-874, R15)

c. Figure No.: 9.5.1-3 Approximate Coordinates: Cols, 5A-6A, J-K
d. Floor Area: 270 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “A”, “B” and “AB”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A” and “AB” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “A” and “B”
d.	Essential Electrical Support:	Train “A” (EDG & Offsite), Train “B” (EDG & Offsite) and Train “AB”
e.	Essential Mechanical Support:	ECW Train “A” and “B” CCW Train “A” and “B” w/ “A” and “B” DCT ACCW Train “A” and “B” w/ “A” and “B” WCT HVC Train “A” and “B” HVR Train “A”, “B” and “AB”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, lubricating oil. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
→(EC-15965, R306)					
West Wall	S	12x10	Yes (FD-103)		X
North Wall	E	12x12	Yes (FD-104)		X
←(EC-15965, R306)					

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area is provided through an "A" label fire door (D245) located on the west wall which connects to the common corridor in fire area RAB 39.

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

Primary:

Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

RAB 38

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to floor drain sump EL. -35.00 ft msl. The pumps discharge into the waste tanks.

VI. Analysis of Effects of Potential Fires:

→(DRN 06-874, R15)

In the Emergency Feedwater Pump “B” Area, in situ combustible materials include limited quantities of lubricating oil. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

←(DRN 06-874, R15)

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of lubricating oil released from the equipment. The second type is a transient combustible exposure fire. Potential fire severity is minimized by the confinement and drainage of released combustible liquids and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "B" train equipment. Safe plant shutdown can be accomplished using "A" train shutdown components and the control of radioactive releases to the environment is maintained.

RAB 39

VII. Appendix R Deviations:

No specific deviations from Appendix R to 10CFR50 are requested for this area.

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: -35.00 and -4.00 Ft. MSL
b. Space Name: GENERAL AREA Approximate Coordinates: Cols,
c. Figure No.: 9.5.1-3 and 9.5.1-4 1A-12A, G-L on EL. -35.00 ft MSL
d. Floor Area: 16,107 sq ft Cols, 4A-6A, H-J on EL. -4.00 ft MSL
e. Zones Within the Fire Area: None

RAB 39

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “A” or “B” (depending on location of fire in RAB 39)
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “B” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “B”
d.	Essential Electrical Support:	Train “A” (Offsite), Train “B” (EDG & Offsite)
e.	Essential Mechanical Support:	ECW Train “A” and “B” CCW Train “A” and “B” w/ “A” and “B” DCT ACCW Train “B” w/ “B” WCT HVC Train “B” HVR Train “B” (also HVR Train “A” to CCW system loads, when required)

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation, lubricating oil, and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

Equipment that may contain contaminated materials are located in areas where the combustible loading is negligible and, therefore, direct flame impingement on the equipment is not postulated.

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

→(DRN 03-993, R13)

All vertical cable trays are provided with firebreaks at approximately 15 foot intervals. Selected essential (Safe Shutdown) raceways are provided with one-hour fire rated barriers as determined by EC-F00-0026, Post-Fire Safe Shutdown Analysis. The charging pump "A" cubicle is isolated from B and AB charging pumps by full height one-hour fire rated walls.

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

RAB 39

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
North Wall	E	16 D	Yes (FD-3A)	X	
North Wall	E	12 D	Yes (FD-4A)	X	
North Wall	E	16 D	Yes (FD-5)	X	
→(EC-15965, R306)					
Ceiling	E	36 x 36	Yes (FD-106)		X
South Wall	S	20 x 20	Yes (FD-187A)		X
Ceiling	S	60 x 40	Yes (FD-108)		X
East Wall	S	12 x 10	Yes (FD-103)		X
Ceiling	E	18 D	Yes (FD-12)	X	
South Wall	E	12 x 12	Yes (FD-104)		X
East Wall	S	12 x10	Yes (FD-102)		X
North Wall	E	12 x 12	Yes (FD-101)		X
East Wall	S/E	16 D	Yes (FD-1)	X	
North Wall	S	30 D	Yes (FD-6)	X	
West Wall (EL. -4.00)	E	14 x 16	Yes (FD-107A)		X
←(EC-15965, R306)					

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area are provided through six fire doors (D163, D167, D170, D242, D245 and D246) leading to various adjacent fire areas. There are also enclosed stairs, with "B" label fire doors at Columns J-3A (D165 and D166) and at J-9A (D172). Doors D163, D167 and D170 are provided with letters of equivalence. Doors D242, D245 and D246 are provided with "A" labels.

b. Detection:

Ionization smoke detectors are provided in areas of significant combustible loadings.

c. Fire Protection:

Primary:

A partial pre-action automatic sprinkler system is provided for this fire area. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are-indicated on General Arrangement drawings.

←(DRN 00-343, R11)

RAB 39

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to area sumps. Sump pumps discharge into the waste tanks.

VI. Analysis of Effects of Potential Fires:

In the General Area, in situ combustible materials include moderate amounts of lubricating oil, ordinary combustible materials, and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation, lubricating oil or ordinary combustible materials. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; the confinement and drainage of released combustible liquids; and administrative controls to limit quantities of transient and in situ ordinary combustible materials.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, damage would be limited to unprotected "A" and "AB" train essential safe shutdown equipment. In the event that an unmitigated fire is in the charging pump area either Charging Pump A or Charging Pumps B and AB will be available for reactivity control and reactor coolant makeup. In the event that an unmitigated fire is in the corridor area (near Column 10A, H-J), cold shutdown can be accomplished by manually operating the SDHX outlet valves. The capability for safe plant shutdown and control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted in this area, specifically:

1. The need for total area wide coverage of smoke detection and automatic fixed suppression systems.

2. The need for a complete 1-hour barrier between redundant safe shutdown equipment.

RAB 39

3. The existence of 1-1/2 hour fire dampers in the fire area boundaries.

4. The enclosure of redundant cable tray and conduit in the same 1-hour rated fire wrap.

5. The existence of block wall-to-slab seal assemblies without documented hourly fire ratings.

b. The basis for these exceptions is as follows:

1. Absence of detection and automatic fixed suppression for:

- Waste gas processing rooms, boric acid condensate room, spent resin tank room, laundry room and waste management system rooms:

- Boric acid make-up tank rooms

→EC-18667, R304)

- Boric Acid Preconcentrator Filter Rooms, Oil Filter Room, Waste Filter Room and Laundry Filter rooms.

←(EC-18667, R304)

a) These locations contain either no safe shutdown equipment or the equipment consists of metal tanks, piping and other systems that are noncombustible and are not likely to be damaged by a fire.

b) Separated from remainder of fire area by discontinuous reinforced concrete fire walls with wire mesh doors and unrated penetrations.

c) Presence of detection and automatic fixed suppression in spaces adjacent to these rooms.

d) Negligible combustible loading.

→(EC-18667, R304)

- Subfloor below Charging Pump rooms

a) Greater than 30 feet horizontal separation between redundant safe shutdown Charging Pump A and B circuits with no intervening combustibles.

b) Torturous path for redundant safe shutdown components. Two concrete walls with 3’ x 4’ openings in each wall.

c) Automatic detection and suppression in charging pumps room above the subfloor.

→(LBDCR 14-020, R308)

d) Negligible combustible loading & no ignition sources.

←(EC-18667, R304, LBDCR 14-020, R308)

2. Part height 1-hour walls constructed around charging pump "A":

a) Detection and automatic suppression protection provided for all redundant equipment.

b) Overhead interference makes construction of complete 1-hour wall cost-prohibitive.

c) Charging pump "A" cable trays and conduit have been provided with a 1-hour fire wrap.

3. Existence of the following 1-1/2 hour fire dampers located in the area boundaries: FD-1, FD-5, FD-6 and FD-12.

a) Smoke detection exists on both sides of damper.

b) Fire severity of adjacent areas is less than fire rating of each damper.

RAB 39

4. Enclosure of essential redundant cable tray conduit in the same 1-hour wrap for the Shutdown Cooling System:

   a) Regulatory Guide 1.75 separation criteria provides assurance that an internal tray or conduit fire will not propagate to a redundant tray conduit.

      1) This separation between one cable tray and a redundant cable tray or conduit within the same fire wrap is accomplished by providing the subject cable tray with either a metal tray cover or a 1/2 inch blanket cover (i.e., 30 minute fire rating). Where access and spatial separation between cable trays allow, a 1-1/2 inch blanket tray cover (i.e., 1-hour fire rating) is preferred over a 1/2 inch blanket.

   b) One-hour wrap provides sufficient protection to redundant cabling until actuation of automatic suppression system or arrival of fire brigade.

5. Lack of a documented hourly fire rating based on ASTM E-119 for Stairwell Enclosure 7 at Column 3A, Stairwell Enclosure 6 at Column 8A and Elevator Shaft C at Column 6A.

   a) Gap sealed walls have sprinklers and smoke detectors on one side of the enclosure walls.

   b) The interior of the stairwell contains negligible combustibles. The interior at the elevator shaft has a low combustible load.

RAB 40

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: -35.00 Ft- MSL
b. Space Name: DIESEL OIL STORAGE TANK "A"
c. Figure No.: 9.5.1-13 Approximate Coordinates: Cols, 1A-2AZ, L-M
d. Floor Area: 625 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “A”, “B” and “AB”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A”, “B” and “AB” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “A” and “B”
d.	Essential Electrical Support:	Train “A” (Offsite), Train “B” (EDG & Offsite) and Train “AB”
e.	Essential Mechanical Support:	ECW Train “A” and “B” CCW Train “A” and “B” w/ “A” and “B” DCT ACCW Train “A” and “B” w/ “A” and “B” WCT HVC Train “A” and “B” HVR Train “A”, “B” and “AB”

←(DRN 03-993, R13)

RAB 40

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, diesel fuel oil. The potential fire duration is assumed not to exceed 3 hours since the diesel fuel oil storage tank and associated piping meet seismic Category I and Safety Class 3 design and construction criteria. This design and construction criteria, coupled with the heat dissipating capability of the liquid filled tank and piping, provide adequate protection from the radiative and convective effects of a postulated fire until actuation of smoke detection and automatic fixed suppression or arrival of the fire brigade.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

→(DRN 03-993, R13)

Fire area boundary design rating is 3 hours (const. only).

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

No duct penetrations.

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area is through an open passageway provided by a ladder from EL. -35.00 ft msl, located on the north wall of the area, leading to a platform at EL. -20.00 ft msl, which then leads to the Cooling Tower Areas.

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection:

<u>Primary:</u>

An automatic wet pipe sprinkler system is provided for this entire fire area. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

RAB 40

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose station is indicated on General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floors drains, to oil sump at EL. -35.00 ft msl. The pumps discharge into the turbine building industrial waste discharge header.

VI. Analysis of Effects of Potential Fires:

In the Diesel Oil Storage Tank 'A' Area, in situ combustible materials include substantial quantities of diesel fuel oil. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of diesel fuel oil released from the storage tank or piping. The second type is a transient combustible exposure fire. Potential fire severity is minimized by the confinement and drainage of released combustible liquids and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic area wide suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected.that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to the diesel oil storage tank A and the DGA fuel oil transfer pump. Safe plant shutdown can be accomplished using "B" train shutdown equipment and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

No specific deviations from Appendix R to 1OCFR50 are requested for this area.

RAB 41

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: -35.00 Ft. MSL
b. Space Name: DIESEL OIL STORAGE TANK "B"
c. Figure No.: 9.5.1-13 Approximate Coordinates: Cols, 11AZ-12A, L-M
d. Floor Area: 417 sq ft

RAB 41

e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “A”, “B” and “AB”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A”, “B” and “AB” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “A” and “B”
d.	Essential Electrical Support:	Train “A” (EDG & Offsite), Train “B” (Offsite) and Train “AB”
e.	Essential Mechanical Support:	ECW Train “A” and “B” CCW Train “A” and “B” w/ “A” and “B” DCT ACCW Train “A” and “B” w/ “A” and “B” WCT HVC Train “A” and “B” HVR Train “A”, “B” and “AB”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, diesel fuel oil. The potential fire duration is assumed not to exceed 3 hours since the diesel fuel oil storage tank and associated piping meet seismic Category I and Safety Class 3 design and construction criteria. This design and construction criteria, coupled with the heat dissipating capability of the liquid filled tank and piping, provide adequate protection from the radiative and convective effects of a postulated fire until actuation of smoke detection and automatic fixed suppression or arrival of the fire brigade.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

→(DRN 03-993, R13)

Fire area boundary design rating is 3 hours (const. only)

←(DRN 03-993, R13)

2. HVAC Penetrations Through Boundary Barriers:

No duct penetrations.

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area is through an open passageway provided by a ladder from EL. -35.00 ft msl, located on the north wall of the area, leading to a platform at EL. -20.00 ft msl.

b. Detection:

Ionization smoke detectors are provided for this fire area.

c. Fire Protection

Primary:

An automatic wet pipe sprinkler system is provided for this entire fire area. Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are located on the General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains, to oil sump at EL. -35.00 ft msl. The pumps discharge into the turbine building industrial waste discharge header.

VI. Analysis of Effects of Potential Fires:

In the Diesel Oil Storage Tank 'B' Area, in situ combustible materials include substantial amounts of diesel fuel oil. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of diesel fuel oil released from the storage tank or piping. The second type is a transient combustible exposure fire. Potential fire severity is minimized by the confinement and drainage of released combustible liquids and administrative controls of transient combustibles.

RAB 41

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, automatic area wide suppression, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to the diesel oil storage tank B and the DGB fuel oil transfer pump. Safe plant shutdown can be accomplished using A train shutdown equipment and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

No specific deviations from Appendix R to IOCFR50 are requested for this area.

RCB

I. Description of Fire Area:

a. Building: REACTOR CONTAINMENT Elev: All
b. Space Name: (All Areas Within Building)

a. Figure Nos.: 9.5.1-13, 9.5.1-15, Dwg. G210 and Dwg. G1368
Approximate Coordinates: Cols, 4A-10A, L-T

d. Floor Area: 31,813 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “A”, “B”, and “AB”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A”, “B” and “AB” w/ S/G 1 and 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “A” and “B”
d.	Essential Electrical Support:	Train “A” (EDG & Offsite), Train “B” (EDG & Offsite) and Train “AB”
e.	Essential Mechanical Support:	ECW Train “A” and “B” CCW Train “A” and “B” w/ “A” and “B” DCT ACCW Train “A” and “B” w/ “A” and “B” WCT HVC Train “A” and “B” HVR Train “A”, “B” and “AB”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation, charcoal and lubricating oil. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

Sources of radioactive materials are present within the various components located in the Reactor Containment Building during normal operation and station shutdown periods.

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

Vertical cable trays are provided with firebreaks at approximately 15 foot intervals. The conduits for one division of Shutdown Cooling System Isolation Valves are wrapped wherever there is less than a 20 foot separation between redundant cables. The Shutdown Cooling System Isolation Valves' electrical penetrations are protected by radiant energy shields.

2. HVAC Penetrations Through Boundary Barriers:
All penetrations are protected with containment isolation valves. All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for the Reactor Containment Building are provided at the locations described below:

a) A personnel lock (center line located at EL. +11.00 ft msl and 18 degrees east of Column 7A) which discharges into fire area RAB 32 at EL. -4.00 ft msl.

b) A 14 ft diameter equipment and maintenance hatch (center line EL. located at +26.5 ft msl and 7-1/2 degrees north of Column 0) which discharges into a walkway providing access to the Cooling Tower Area and Fuel Handling Building.

c) An escape lock (center line located at EL. +25.00 ft msl and 37-1/2 degrees west of Column 7A).

d) Access to the containment Shield Building (annulus) is provided through an access lock (center line EL. at +25-00 ft msl and 52-1/2 degrees west of Column 7A). Both of the locks mentioned in items 3 and 4 discharge into a walkway providing ingress to the cooling towers and Fuel Handling Building at EL. +21.00 ft msl.

b. Detection:

→ (DRN 99-1018, R11, 99-0971; 01-1459, R11-B, EC-25884, R305)

Inside Primary Containment, ionization smoke detectors are provided for the electrical penetration area, the cable assembly area (El. +21.00 ft msl), and for the cable trays on either side of the reactor at approximately floor Elevation +46 ft msl. This also provides partial area detection for the reactor and the steam generators. Charcoal filter enclosures are provided with temperature sensors as part of the decay heat monitoring system. [Reference ER-WF3-FP-10-023 “ANNULUS AREA FIRE DETECTION SYSTEM” (EC-25884)].

← (DRN 99-1018, R11, 99-0971; 01-1459, R11-B, EC-25884, R305)

c. Fire Protection:

Primary:

→(DRN 01-1459, R11-B)

A manually activated water spray system is provided over charcoal beds in filter units E-13 (3A-SA) and E-13 (3B-SB).

←(DRN 01-1459, R11-B)

Seconday:

→ (DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Portable fire extinguishers are provided in accessible locations in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers and hose stations are indicated on General Arrangement drawings.

← (DRN 00-343, R11)

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by the containment sump pumps. The pumps discharge into the waste tanks.

VI. Analysis of Effects of Potential Fires:

In the Reactor Containment Building, in situ combustible materials include moderate amounts of charcoal in filter enclosures, lubricating oil in RCP pumps, and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation, charcoal or lubricating oil released from the RCP pumps. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; the confinement and drainage of released combustible liquids (oil collection system for RCP pumps); and administrative controls of transient combustibles.

→ (DRN 01-1459, R11-B)

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, manual deluge suppression for internal charcoal filter units, and a trained fire brigade.

← (DRN 01-1459, R11-B)

RCB

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, damage would be limited to and may affect the following redundant safe shutdown components on an individual basis:

a. Pressurizer heater cables - In the unlikely event a fire in the pressurizer skirt area disables the pressurizer heaters, reactor coolant pressure control is accomplished by using the auxiliary spray function of the chemical volume control system.

b. Safety injection tank isolation valve cables - In the unlikely event a fire precludes closing one or more of these valves, the valve may be closed manually by handwheel operators.

c. Steam generator pressure indication - In the unlikely event a fire disables steam generator pressure indication, safe shutdown cooling can be monitored by pressure transmitters located outside of containment on the main steam lines.

d. Charging line isolation and auxiliary spray valves - In the unlikely event a fire in the regenerative heat exchanger cubicle disables these valves, reactor coolant makeup and pressure control can be accomplished by using the charging pumps via an alternate injection path and by using the pressurizer heaters, which are unaffected by a fire in this area.

VII. Appendix R Deviations:

a. Relief from the technical requirements of 10CFR50, Appendix R, Section III.G.2 has been granted to the extent that redundant systems within containment be separated by more than 20 ft. without intervening combustibles. The justifications for these deviations are based on demonstrating that by a combination of physical distance, inherent barriers such as shield walls, and the low levels of intervening combustibles, that at least one channel or division of safe shutdown equipment will be available post-fire. In addition, it was also shown that alternative instrumentation is available to the Control Room operator to safely shut down the unit should a fire disable the normal safe shutdown instrumentation. The deviations affect the following shutdown-related systems/cables:

1. Pressurizer heater cables

2. Shutdown cooling isolation valves and related cables

3. Pressurizer pressure/pressurizer level indication transmitters and related cables

4. Steam generator level indication cables

5. Reactor coolant system (RCS) hot-leg temperature indication cables

6. RCS cold-leg temperature indication cables

7. Neutron flux indication channels

8. Containment fan cooler cables

The configuration of these systems/cables within containment, with the exception of the pressurizer heater cables where horizontal separation is less than 10 ft., is such that at least 20 ft. of horizontal distance separates redundant shutdown components or cables. This separation is achieved for the shutdown cooling system isolation valves/cables by the use of radiant energy barriers. Combustible cable insulation is present in the intervening space. However, the quantity of intervening combustibles is insignificant and the cables are qualified to IEEE-383. If a fire were to occur, it would be of limited magnitude and extent. It would be detected in its initial stages by the existing smoke and fire detection systems before significant damage occurred.

The smoke and hot gases from a containment fire would be dissipated throughout the large containment area. As a result, if a fire should occur near one set of shutdown systems, the existing physical separation, coupled with the dispersion of hot gases, provides assurance that an undamaged shutdown capability will remain available during and after a fire.

In the unlikely event a fire should cause the loss of the pressurizer heaters, emergency operating procedures provide for safe shutdown without the heaters.

b. Relief from the technical requirements of Section III.0 of Appendix R to 1OCFR50 to provide an oil collection system capable of holding the entire lube oil system inventory from all Reactor Coolant Pumps has been granted based on the following:

1. The four RCPs have a gravity drain piping system in conjunction with their oil pan/enclosures, installed to transport leaking lube oil from all potential pressurized and unpressurized leakage sites in their lube oil systems, via two separate collection headers. Each header serves two pumps and feeds into an individual 200-gal oil collection tank which is installed outside the steam generator shield walls. Each of these tanks has the capacity to hold the entire inventory of lube oil from one RCP.

2. Each RCP is protected by a thermistor wire heat detection system and an automatic fire suppression system. Also, the oil collection system and the RCP lube oil systems are seismically designed to preclude their failure during a seismic event that could potentially affect any safety-related equipment.

3. Because the existing RCP motor lube oil system is capable of withstanding design-basis earthquake conditions, only random oil leakage is anticipated, such as that which may occur at pipe joints. Small quantities of the lube oil might be ignited by hot surfaces. However, because of the limited quantity of escaping oil and the automatic fire suppression system, the resulting fire, if one should occur, would represent no significant fire hazard or otherwise endanger safety-related equipment.

→(DRN 99-1018, R11; 01-1459, R11-B)
←(DRN 99-1018, R11; 01-1459, R11-B)

c. Relief from the technical requirements of Section III.0 of Appendix R to 10CFR50 to provide an oil collection system covering remote oil fill lines has been granted based on the following.

1. The remote fill lines are empty except for the duration of the fill activity.

RCB

2. Shutdown equipment in the vicinity of the RCPs is limited to steam generator pressure indication and if an unmitigated fire were to occur safe shutdown cooling could be monitored by pressure transmitters located on the main steam lines outside of containment.

3. The measures taken during oil filling, the lack of oil fill system pressurization, and the limited potential fire size from the volumes of oil typically added during power operations, provide reasonable assurance that significant damage would not occur in the containment building from a worst case postulated fire.

4. Fire detection and suppression equipment are available in the vicinity of the remote fill lines.

FHB

→(DRN 01-1459, R11-B)

NOTE: RCP suppression and detection systems are not credited (Ref. ER-W3-2001-1174).

←(DRN 01-1459, R11-B)

I. Description of Fire Area:

a. Building: FUEL HANDLING Elev: -35.00, +1.00, +21.00 and +46.00 Ft. MSL
b. Space Name: (ALL AREAS WITHIN BUILDING)
c. Figure No.: 9.5.1-11 Approximate Coordinates: Cols, 1FH-7FH, T-W
d. Floor Area: 17,367 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

NONE

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation lubricating oil, charcoal and ordinary combustible materials. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

Sources of radioactive materials are present in the fuel handling area. The spent fuel is stored underwater. A fire developing in these areas will not cause release of radioactive materials

V. Fire Control:

a. Physical Containment:
   1. Fire Area Boundary Barriers:
      Fire area boundary design rating is 3 hours.
   2. HVAC Penetrations Through Boundary Barriers:

FHB

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
North Wall	E	96 x 36	No		X
North Wall	E	24 x 24	No	X	
North Wall	E	24 x 24	No	X	
North Wall	R	54 x 48	No		X
North Wall	R	96 x 36	No		X
North Wall	E	42 x 42	No		X

All piping and tray penetrations are sealed.

3. Ingress and Egress:

The building contains floor levels at EL. -35.00 ft msl, +1.00 ft msl, +21.00 ft msl, and +46.00 ft msl. Ingress and egress for EL. -35.00 ft msl are provided by two "A" label emergency doors (D204 and D206) located in the east and west walls. The doors open into the Cooling Tower Area. Ingress and egress for EL. +1.00 ft msl are provided by a stairwell located along the west wall. This stairwell leads to EL. +21.00 ft msl and +46.00 ft msl. Ingress and egress for EL. +21.00 ft msl are provided by two tornado doors. One door (D37), located in the south wall, provides ingress to the Cooling Tower Area which in turn leads to the Yard Area. The other door, located on the west wall in the unloading bay, leads to outside concrete deck at EL. +18.00 ft msl. Door D37 is located on an exterior wall whose primary function is other than fire resistance.

b. Detection:

→(DRN 99-0971)

Ionization smoke detectors are provided in areas of significant combustible loadings. Charcoal filter enclosures are provided with temperature sensors as part of the decay heat monitoring system.

←(DRN 99-0971)

c. Fire Protection:

Primary:

Portable fire extinguishers are provided in accessible locations in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

←(DRN 00-343, R11)

FHB

d. Smoke Venting:

The normal ventilation system may be used for smoke removal. Portable smoke ejector equipment is provided for use by the fire brigade.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to sump at EL. -35.00 ft msl. Pumps discharge into the waste tanks.

VI. Analysis of Effects of Potential Fires:

In the Fuel Handling Building, in situ combustible materials include limited amounts of lubricating oil, charcoal in filter enclosures, ordinary combustible materials, and minor amounts of cable insulation. Transient Materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this area. The first type is an in situ combustible exposure fire which assumes ignition of either localized concentrations of cable insulation lubricating oil released from pumps, charcoal or ordinary combustible materials. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; the confinement and drainage of released combustible liquids; and administrative controls to limit quantities of transient and in situ ordinary combustible materials.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby hose stations, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner. The potential fires are not considered to have sufficient magnitude or potential for spread to cause failure of safe shutdown equipment and associated cabling in adjacent fire areas. As there is no essential equipment in this fire area, the capability for safe plant shutdown and the control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

No specific deviations from Appendix R to 10CFR50 are requested for this area.

CT A

I. Description of Fire Area:

a. Building: COOLING TOWER AREA Elev: -35.00 Ft- MSL
b. Space Name: COOLING TOWER "A" +21.00 Ft. MSL
c. Drawings G210 and G1356, Approximate Coordinates: Cols, IA-3FH, M-W
d. Floor Area: 10,352 sq ft

e. Subspaces Within the Fire Area: None

CT A

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “B” and “AB”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “B” and “AB” w/ S/G 1 and S/G 2

c. Decay Heat Removal, Cold Shutdown: LPSI Pump “B”

d. Essential Electrical Support: Train “A” (Offsite), Train “B” (EDG & Offsite) and Train “AB”

←(EC-19062, R306)

e. Essential Mechanical Support: ECW Train “B”
CCW Train “B” w/ “B” DCT
ACCW Train “B” w/ “B” WCT
HVC Train “B”
HVR Train “B” and “AB”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, cable insulation and negligible amounts of permanent combustibles. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:
Radioactive materials may be present within waste management piping.

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

A 3-hour fire boundary design rating is provided for the envelope perimeter.

2. HVAC Penetrations Through Boundary Barriers:

→(EC-15965, R306)

Duct Penetration Location	Function	Duct Size (in)	Fire Damper	Safety Related	Description
East Wall	E	10x6	Yes (FD-218)		E-57 to RAB32

←(EC-15965, R306)

All piping and tray penetrations are sealed.

3. Ingress and Egress:

CT A

Ingress and egress for the Cooling Tower Areas are provided at EL. -35.00 ft msl by an "A" label emergency door (D206) leading to the Fuel Handling Building and various open stairways, ships ladders and internal doorways leading from EL. +21.00 ft msl. An open grating platform at EL. -20.00 ft msl, leads to the open passageway leading to fire area RAB 40. The walkway at EL. +21.00 ft msl is the main ingress and egress to this area and leads from the west access area through two outside wall doors (D34, D34A). The metal siding covered walkway leads north into the Fuel Handling Building (D37) and leads south into the Reactor Auxiliary Building (D35 and D36), fire area RAB 25. Various ships ladders lead to the walkway roof at EL. +40.00 ft msl and from there to various other elevations. The Equipment and Maintenance Hatch in the Containment Building wall can be used from the walkway, located between Column Lines R and Q. The open concrete deck on the north end of the Cooling Tower Area is at EL. +18-00 ft msl, upon which is provided railroad tracks leading into the Fuel Handling Building through a special tornado type doorway arrangement. There are also large air intake openings on the east wall starting at El. -8ft MSL, just above the normal water levels in the concrete cooling tower modules, and continuing up to about El. +9 ft MSL. Doors D35, D36 and D37 are located on exterior walls whose primary function is other than fire resistance.

b. Detection:

→ (DRN 99-1018, R11)

Smoke or heat detector is provided over essential equipment and cables. Thermal detectors are provided over the walkway and the equipment removal area between the Fuel Handling Building and the Reactor Auxiliary Buidling at elevation +21 feet.

← (DRN 99-1018, R11)

c. Fire Protection:

Primary:

Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10.

Secondary:

Yard hydrants

d. Smoke Venting:

Natural ventilation is used for smoke removal through the open structure.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to sump which discharges into the storm water drainage system.

CT A

VI. Analysis of Effects of Potential Fires:

In the Cooling Tower 'A' Area, in situ combustible materials include limited amounts of cable insulation and negligible amounts of permanent combustibles. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

Two types of fires have been postulated for this zone. The first type is an in situ combustible exposure fire which assumes ignition of localized concentrations of cable insulation. The second type is a transient combustible exposure fire. Potential fire severity is minimized by: the use of IEEE-383 cables; limiting the continued spread of fire along cable surfaces by providing fire-stops at fire barrier penetrations; and administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby yard hydrants, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "A" train dry and wet cooling towers. Safe plant shutdown can be accomplished with the "B" train cooling towers. The continual control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

No specific deviations from Appendix R to 10CFR50 are requested for this zone.

CT B

I. Description of Fire Area:

a. Building: COOLING TOWER AREA Elev: -35.00 Ft. MSL
b. Space Name: COOLING TOWER "B"
a. Drawings G210 and G1356, Approximate Coordinates:
Cols, 9M-12A, Pl-R
d. Floor Area: 9,610 sq ft
e. Subspaces Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a. RCS Inventory and Pressure Control: Charging Pump “A” and “AB”

→(EC-19062, R306)

b. Decay Heat Removal, Hot Shutdown: EFW Pump “A” and “AB” w/ S/G 1 and S/G 2
c. Decay Heat Removal, Cold Shutdown: LPSI Pump “A”
d. Essential Electrical Support: Train “A” (EDG & Offsite), Train “B” (Offsite) and Train “AB”

←(EC-19062, R306)

e. Essential Mechanical Support: ECW Train “A”
CCW Train “A” w/ “A” DCT
ACCW Train “A” w/ “A” WCT
HVC Train “A”
HVR Train “A” and “AB”

←(DRN 03-993, R13)

CT B

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, negligible amounts of permanent combustibles. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

Radioactive materials may be present in waste management piping.

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

A 3-hour fire boundary design rating is provided for the envelope perimeter.

2. HVAC Penetrations Through Boundary Barriers:

No duct penetrations.

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire zone are provided through an "A" label emergency door (D204) at EL. -35.00 ft msl which provides entry into the Fuel Handling Building.

Ingress and egress to fire Zone RAB 8B is provided by a door (D51) at El. +21 ft. MSL. This door is located in an exterior wall whose primary function is other than fire resistance. There are missile protection gratings located above the Dry Cooling Tower "B" areas. There are large intake openings on the west wall starting at El. -8 ft. MSL, just above the normal water levels in the concrete cooling tower modules.

b. Detection:

→ (DRN 99-1018, R11)

Heat or smoke detector is provided over the essential equipment and cables.

← (DRN 99-1018, R11)

c. Fire Protection:

<u>Primary:</u>

Portable fire extinguishers are provided in accordance with the guidelines of NFPA 10.

CT B

Secondary:

Yard hydrants

d. Smoke Venting:

Natural ventilation is used for smoke removal through the open structure.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by floor drains to sumps which discharge into the storm water drainage system.

VI. Analysis of Effects of Potential Fires:

In the Cooling Tower "B" Area, in situ combustible materials include negligible amounts of permanent combustibles and cable insulation. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

A transient combustible exposure fire has been postulated for this fire zone. An in situ combustible exposure fire is not considered for this zone as only negligible amounts of combustibles are present. Potential fire severity is minimized by administrative controls of transient combustibles.

Mitigating actions include early warning detection capability, portable fire extinguishers, nearby yard hydrants, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to "B" train dry and wet cooling towers. Safe plant shutdown can be accomplished with the "A" train cooling towers. The continual control of radioactive releases to the eavirorment is maintained.

VII. Appendix R Deviations:

No specific deviations from Appendix R to IOCFR50 are requested for this zone.

ROOF E

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +46.00 Ft. MSL
b. Space Name: ROOF E
c. Figure No.: 9.5.1-15 Approximate Coordinates: Cols, 9A-11AZ, L-N
d. Floor Area: 3,442 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “A”, “B” and “AB”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A” and “B” w/ S/G 1
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “A” and “B”
d.	Essential Electrical Support:	Train “A” (EDG & Offsite), Train “B” (EDG & Offsite) and Train “AB”
e.	Essential Mechanical Support:	ECW Train “A” and “B” CCW Train “A” and “B” w/ “A” and “B” DCT ACCW Train “A” and “B” w/ “A” and “B” WCT HVC Train “A” and “B” HVR Train “A”, “B” and “AB”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, negligible amounts of permanent combustibles. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

Duct Penetration Location	Function	Duct Size (Inches)	Fire Damper	Safety-Related	Non-Safety-Related
West Wall	E	24x36	No*		X
North/Containment Wall	Make-up	48"	No		X

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area is provided through a door (D96)located on the west wall which connects to the common stairway in fire area RAB 2. Door D96 is located on the exterior wall whose primary function is other than fire resistance.

b. Detection:

Not required in this area.

c. Fire Protection:

* See CI 305849

Primary:

Portable fire extinguishers are provided outside of the fire area in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→(DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

←(DRN 00-343, R11)

d. Smoke Venting:

Natural ventilation is used for smoke removal through open grating above.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by roof drains which discharge into the storm water drainage system.

VI. Analysis of Effects of Potential Fires:

In the Roof E Area, in situ combustible materials include negligible amounts of permanent combustibles. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

A transient combustible exposure fire has been postulated for this fire area. An in situ combustible exposure fire is not considered for this area as only negligible amounts of combustibles are present. Potential fire severity is minimized by administrative controls of transient combustibles.

Mitigating actions include portable fire extinguishers, nearby hose stations, and a trained fire brigade.

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to emergency feedwater to SG2, the turbine driven EFW pump, and the SG2 atmospheric dump valve. Safe plant shutdown can be accomplished with heat removal through SG1. The continual control of radioactive releases to the environment is maintained.

ROOF E

VII. Appendix R Deviations:

No specific deviations from Appendix R to 1OCFR50 are requested for this area.

ROOF W

I. Description of Fire Area:

a. Building: REACTOR AUXILIARY Elev: +46.00 Ft. MSL
b. Space Name: ROOF W
c. Figure No.: 9.5.1-15 Approximate Coordinates: Cols, 2AZ-5A, L-N
d. Floor Area: 3,439 sq ft
e. Zones Within the Fire Area: None

→(DRN 03-993, R13)

II. Essential Equipment Credited for this Fire Zone/Area

a.	RCS Inventory and Pressure Control:	Charging Pump “A”, “B” and “AB”
b.	Decay Heat Removal, Hot Shutdown:	EFW Pump “A” and “B” w/ S/G 2
c.	Decay Heat Removal, Cold Shutdown:	LPSI Pump “A” and “B”
d.	Essential Electrical Support:	Train “A” (EDG & Offsite), Train “B” (EDG & Offsite) and Train “AB”
e.	Essential Mechanical Support:	ECW Train “A” and “B” CCW Train “A” and “B” w/ “A” and “B” DCT ACCW Train “A” and “B” w/ “A” and “B” WCT HVC Train “A” and “B” HVR Train “A”, “B” and “AB”

←(DRN 03-993, R13)

III. In situ Combustible Material Loadings:

In situ combustible materials consist of, but are not limited to, negligible amounts of permanent combustibles. The calculated fire duration does not exceed the fire resistance rating of the boundary barriers.

IV. Sources of Radioactive Materials:

None

V. Fire Control:

a. Physical Containment:

1. Fire Area Boundary Barriers:

Fire area boundary design rating is 3 hours.

2. HVAC Penetrations Through Boundary Barriers:

No duct penetrations.

All piping and tray penetrations are sealed.

3. Ingress and Egress:

Ingress and egress for this fire area is provided through a door (D97)located on the east wall which connects to fire area RAB 2. Door D97 is located on the exterior wall and its primary function is other than fire resistance.

b. Detection:

Not required in this area.

c. Fire Protection:

Primary:

Portable fire extinguishers are provided outside the fire area in accordance with the guidelines of NFPA 10. Specific types and locations of portable fire extinguishers are indicated on General Arrangement drawings.

Secondary:

→ (DRN 00-343, R11)

Hose stations installed in accordance with the guidelines of NFPA 14 are available for use in this area. Specific locations of hose stations are indicated on General Arrangement drawings.

← (DRN 00-343, R11)

d. Smoke Venting:

Natural ventilation is used for smoke removal through open grating above.

e. Drainage:

Adequate drainage of water used for fire extinguishment will be provided by roof drains which discharge into the storm water drainage system.

VI. Analysis of Effects of Potential Fires:

In the Roof W Area, in situ combustible materials include negligible amounts of permanent combustibles. Transient materials are administratively controlled to limit the amount of such materials to that required for operations and maintenance purposes.

A transient combustible exposure fire has been postulated for this fire area. An in situ combustible exposure fire is not considered for this area as only negligible amounts of combustibles are present. Potential fire severity is minimized by administrative controls of transient combustibles.

Mitigating actions include portable fire extinguishers, nearby hose stations, and a trained fire brigade.

ROOF W

Based on the foregoing discussion, it is expected that any fire would be detected in its incipient stage and extinguished in a timely manner, without damage to safe shutdown components. However, if an unmitigated fire is assumed, loss of safe shutdown components would be limited to emergency feedwater to SG1, the turbine driven EFW pump and the SGl atmospheric dump valve. Safe plant shutdown can be accomplished with heat removal through SG2. The continual control of radioactive releases to the environment is maintained.

VII. Appendix R Deviations:

No specific deviations from Appendix R to 1OCFR50 are requested for this area.

9.5.1.4 Fire Protection of Safe Shutdown Capability

9.5.1.4.1 Safe Shutdown Analysis

→(DRN 03-993, R13)
A safe shutdown analysis was performed to ensure that no single fire can prevent a safe cold shutdown. At least one success path to achieve and maintain safe shutdown conditions remains available in the event of a fire in any fire area. The key factor in achieving this is the availability of electrical power, from either the onsite Electrical Distribution System or offsite power, for at least one safe shutdown success path. There are two primary trains of electrical power available. These are designated as Train A and Train B, and the credited safe shutdown loads are capable of being powered by each train's Emergency Diesel Generator or offsite power. A third train, designated AB or A/B, is also available for selected components, and may be powered by either the A or B Train electrical distribution system. A Train A or B shutdown area utilizes systems and components that receive power from the Train A or B Electrical Distribution System.

In the unlikely scenario that the fire event requires evacuation of the Control Room, alternate shutdown capability is provided which meets the criteria of Sections III.G.3 and III.L of Appendix R. Instrumentation and Controls are provided at the Auxiliary Control Panel, LCP-43, or other local panels and switchgear for systems and equipment that require continuous control and monitoring during shutdown outside the Control Room.

The safe shutdown analysis also considered the impact of "associated" circuits. These are circuits that could prevent operation or cause maloperation of safe shutdown components.

The safe shutdown performance goals are:

a) Reactivity Control - Insert sufficient negative reactivity to achieve and maintain cold shutdown conditions.

This function is accomplished by verifying that following the reactor scram all Control Element Assemblies have dropped into the core. Subsequently, boration to cold shutdown conditions is achieved, and neutron flux is monitored.

b) Reactor Coolant Makeup - Maintain the reactor coolant inventory such that the pressurizer level is within the indicating range.

←(DRN 03-993, R13)

→(DRN 03-993, R13)

This function is accomplished by ensuring the charging pump(s) and the associated flow path are available and by monitoring pressurizer level. The charging pumps are also required for boration. Either the Boric Acid Makeup Tanks or Reactor Water Storage Pool may be used as a source of borated makeup water.

Pressure is controlled by energization of proportional pressurizer heaters when required, by operation of the pressurizer auxiliary spray valve, and by operation of the charging sytem. When the pressurizer heaters are not available, the charging pump is used to maintain pressurizer level as nearly constant as possible during the cooldown process to conserve pressurizer inventory and enthalpy.

c) Reactor Heat Removal – Remove decay heat through cold shutdown conditions.

This function is provided in hot standby and initial plant cooldown by use of the Emergency Feedwater System and Steam Generator Atmospheric Dump Valves. With the reactor shutdown and Reactor Coolant Pumps (RCPs) secured, natural circulation is established between the reactor vessel and at least one of the steam generators. Decay heat is transferred by the Reactor Coolant System (RCS) to the steam generators where it is vented to the atmosphere by releasing steam through the Atmospheric Dump Valves. In cold shutdown, the Low Pressure Safety Injection System operating in the Shutdown Cooling Mode removes reactor decay heat by transferring it to the Component Cooling Water (CCW) System.

d) Process Monitoring – Provide direct reading of the safe shutdown process variables necessary to perform and control the above functions.

This function is provided to achieve and maintain safe shutdown conditions, operators must be able to monitor various plant parameters. These parameters provide the information required by the operator to perform required system transitions and essential operator actions. This function ensures that the instrumentation required to monitor pressurizer level, reactor system pressure, steam generator level, and steam generator pressure is available following any fire. In addition, levels for those tanks credited for safe shutdown must be monitored to ensure adequate inventory and proper system operation.

e) Support Functions – Provide electrical power, cooling water, lubrication, HVAC, etc., as required to permit the operation of equipment used for safe shutdown functions.

This function provides support functions credited to achieve and maintain safe shutdown include the following.

1. Provide AC and DC power to switchgear, load centers, and motor control centers supplying power to safe shutdown components.

2. Provide cooling water to the emergency diesel generators and safe shutdown system heat exchangers.

3. Provide Heating, Ventilation, and Air Conditioning to the areas where required.

←(DRN 03-993, R13)

→(DRN 03-993, R13)
For a postulated fire involving a loss of off-site power, the Standby AC Power Supply and Distribution System is the ultimate source of AC electrical power for the safe shutdown systems. Essential components of this system include the Emergency Diesel Generators and supporting equipment (control power, air start system, diesel fuel supply, etc.), the 4.16kV emergency switchgear, 480V emergency switchgear, and motor control centers supplied by the emergency switchgear. When available, offsite power may be used to power the 4.16kV emergency switchgear and associated downstream loads, switchgear, and MCCs.

Safe shutdown also requires the availability of the 125V DC power supplies and distribution system. Stored battery energy supplying 125V DC power is sufficient to support the needs of safe shutdown equipment until AC on-site power and battery charging capabilities are restored. DC Control Power is required to ensure circuit breaker operability and tripping capability is maintained.

The Component Cooling Water System removes heat from the various components credited for post-fire safe shutdown and delivers it to the Dry Cooling Towers. If necessary, its cooling capacity can be augmented by the Auxiliary Component Cooling Water System, which transfers heat to the Wet Cooling Towers.

The Essential Chilled water system supplies chilled water to air conditioning systems throughout the plant and transfers the heat to the Component Cooling Water System.

The HVAC Systems serving the Control Building, Containment Building, Reactor Auxiliary Building, and Diesel Generator Building provide cooling for the areas containing components credited for post-fire safe shutdown so that they can function, as required, without failure during the fire event.

The Fire Area-By-Fire Analysis identifies, by fire area, the credited safe shutdown train for each fire area.

9.5.1.4.2 Alternative Shutdown Capability

Alternative shutdown measures are provided for the Control Room and the Cable Vault area.

In the Control Room and Cable Vault areas, it is not physically possible to protect all redundant safe shutdown systems (cables) against the adverse effects of spurious signals, fires or fire suppression activities. In the event that a fire disables the Control Room or Cable Vault area, the auxiliary control panel (LCP-43) and other local control stations, which are in separate fire areas, provide the alternative shutdown capability. Alternative shutdown capability provides safe shutdown control functions and indications at the local panels that are electrically isolated or are otherwise separate and independent from the Control Room and Cable Vault area. Electrical isolation is ensured by the use of transfer and isolation switches.
←(DRN 03-993, R13)

9.5.1.4.3 Primary Coolant System Interfaces

Several low pressure systems are connected to the high pressure primary coolant system. In these instances, low pressure system isolation is provided by redundant, electrically operated valves. The design of these systems ensures that a fire induced LOCA cannot result from a single fire opening two valves in series at a high/low pressure interface.

The following low pressure systems are connected to the high pressure primary system and use redundant, electrically controlled devices to isolate or preclude rupture of any primary coolant boundary.

a) Letdown Isolation
b) Primary Sampling
c) Rector Coolant Gas Vent System
d) Shutdown Cooling Isolation

The letdown line is provided with four pneumatic valves in series, each of which is capable of isolating the RCS. They consist of the letdown stop valve, the letdown containment isolation valve inside containment, the letdown containment isolation valve outside containment, and one of two letdown control valves outside containment. All valves fail close on loss of air or loss of power. In the unlikely event of a fire induced spurious failure leading to a letdown control valve to fail open, the operator can isolate letdown using any one of the other three valves.

The RCS is provided with three independent sampling paths (Surge Line, RCS Hot Leg, and Pressurizer Steam Space). Each line has redundant pneumatic valves which fail close on loss of air or power. The valves located inside the containment are powered from the SB DC bus and the valves located outside containment are powered from the SA DC bus. In addition, each line has a restriction orifice designed to limit flow to less than the makeup capability of one charging pump in the event of any failure in the downstream line. Thus, these passive devices eliminate the possibility of a LOCA through these lines.

The Reactor Coolant Gas Vent System is provided with redundant solenoid valves that are normally key-locked closed in the Control Room and which fail closed on a loss of power. Both vent lines have restriction orifices which are designed to limit flow to less than the makeup capability of one charging pump in the event of any failure in the downstream lines. Thus, as stated for the sample lines, these passive devices eliminate the possibility of a LOCA through these vent paths.

The RCS is isolated from the Shutdown Cooling System (SDCS) (i.e., Residual Heat Removal System) by two valves, one motor operated and one hydrualic-pneumatic operated, in a series arrangement in each of the loop 1 and loop 2 shutdown cooling suction lines inside the containment. Motor operated valves 1SI-V1502B and 1SI-V15O4A are key-locked closed, fail-as-is valves. Hydraulic-pnematic valves ISI-V15O1A and 1SI-V1503A are key-locked closed, fail closed valves. These isolation valves are provided with pressure interlocks as described in Section 7.6. A third key-locked closed motor operated valve in each SDCS suction line outside containment provides containment isolation. This arrangement at the RCS/SDCD interface is in compliance with the recommendations of Branch Technical Position RSB 5-1. Valves 1SI-V1503A and 1SI-V15O4A are powered by the SA-Train and valves 1SI-V1501B and ISI-Vl5O2B are powered by the SB-Train. The containment isolation valves, 2SI-V327A and 2SI-V362B in each SDCS suction line are powered by the SA-Train and SB-Train, respectively. In addition to pressure interlocks, the SDCS is protected by relief valves (see Subsections 9.3.6 and 6.3.2).

Normal operating procedures will require that the feeder circuit breakers for motor operated valves (ISI-V1504A and ISI-1502B) be opened and locked in the open position during normal operation. This will avoid inadvertent opening of these valves due to fire. The control circuits to these valves are not protected by a fire barrier as spurious operation is precluded when the circuit breakers are opened.

9.5.1.5 Inspection and Testing

The plant's fire protection systems are inspected, tested, and serviced periodically during the life of the plant. During installation, the fire protection systems were inspected and tested in accordance with written test procedures. These inspections and tests included the following:

a) Visual inspection,
b) Hydrostatic test of fire lines,
c) Functional test of operating components,
d) Tests to verify that the fire pumps satisfy design specifications, and
e) Tests to verify the proper response of alarm systems and controls.

Inservice inspection and testing of the fire protection systems include the following:

a) Routine visual inspections of system and system components to assure operability,

b) At least an 18 month functional test of the fire pumps at full capacity, and

c) Scheduled testing of each detection device and of control circuits for the alarm systems and automatic suppression systems.

9.5.1.6 Personnel Qualifications and Training

9.5.1.6.1 Personnel Qualifications

→(DRN 03-993, R13)
The individuals responsible for fire protection systems and programs have numerous years of experience in the area of Property Loss Conservation, specifically, the fire hazards associated with nuclear power generating facilities. To this end, Waterford 3 has on staff, or available through consultants, Fire Protection Engineers who meet the educational and experience requirements necessary for full membership in the Society of Fire Protection Engineers.
←(DRN 03-993, R13)

9.5.1.6.2 Fire Brigade

A site fire brigade ensures adequate manual firefighting capability for all areas of the plant containing structures, systems, or components important to safety. This fire brigade consists of five personnel on each shift trained and equipped in accordance with those requirements of Sections H and I of Appendix R to 10CFR50.

The strategies for fighting fires in all safety-related areas and areas presenting a hazard to safety-related equipment are provided in accordance with 10CFR50, Appendix R, Section III.K.12. Additional procedures are provided to define duties and responsibilities of other plant personnel during a fire.

9.5.1.6.3 Administrative Controls

→(DRN 03-993, R13)
Administrative controls ensure the continued functioning of the plant fire protection systems and dictate personnel actions. Plant administrative procedure UNT-005-013, Fire Protection Program, describes, and delineates responsibilities, control and implementing requirements for the Waterford 3 fire protection program. The Technical Requirements Manual (TRM) contains operability and surveillance requirements, and compensatory measures for fire protection systems which were previously contained in the Technical Specifications, but have been removed consistent with the guidance of Generic Letters 86-10 and 88-12. Changes to the TRM will be made in accordance with the Facility Operating License.
←(DRN 03-993, R13)

9.5.1.6.4 Quality Assurance Requirements

➔(DRN 03-993, R13)
The Quality Assurance Program for fire protection activities is part of the overall company QA program as described in the Fire Protection Program.

The Quality Program for Fire Protection during the operations phase is based upon those 10CFR50 Appendix B criteria necessary to satisfy the guidance provided by Branch Technical Position CMEB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants." Those criteria applied to Fire Protection are:
🡐(DRN 03-993, R13)

Design and Procurement Document Control
Instructions, Procedures and Drawings
Control of Purchased Material, Equipment and Services
Inspection
Test Control
Inspection, Test and Operating Status
Nonconforming Items
Corrective Actions
Records
Audits

➔(DRN 03-993, R13; LBDCR 13-015, R308)
The Quality Assurance Program for Fire Protection is under the management control of the Site Vice President.
🡐(DRN 03-993, R13; LBDCR 13-015, R308)

9.5.2 COMMUNICATION SYSTEMS

9.5.2.1 Design Bases

A comprehensive communications system is provided to assure reliable intraplant communication, in the protected area, offsite commercial telephone service, and offsite emergency communication capabilities during normal, fire and accident conditions including loss of offsite power.

AC power for the communication system is supplied by static uninterruptible power systems.

9.5.2.2 System Description

The communication facilities are as follows:

a) Intraplant voice communication is provided by a Private Automatic Branch Exchange (PABX) telephone system which will also interconnect with the central office of the South Central Bell Telephone System.

b) Intraplant voice paging is provided by a system of high-level audio amplifiers and speakers.

c) Site alarm signals are provided through the paging system. Plant evacuation signals are provided in accordance with 10CFR50 Appendix E. Fire alarm signals meet appropriate NFPA Standards.

d) Two radio communication systems are provided, and for intraplant operation and maintenance, (O&M) and a second system for offsite communication.

e) A sound-powered headset intercom system provides communication for maintenance and operational purposes. The refueling operation intercom is a dedicated circuit in this system. It provides communication between the Fuel Handling Building and Reactor Building operating levels and the main control room.

f) The main control room is provided with PABX dial telephone, PA paging, radio, and sound-powered headset communication facilities. These facilities are duplicated in the remote shutdown panel room.

g) Plant working stations located throughout the plant site are provided with communication facilities so that personnel can communicate with other working stations and/or the main control room and/or the remote shutdown room.

h) Two-way communication, vital to safe shutdown and emergency response in the event of a fire, is provided in accordance with Regulatory Guide 1.120 (BTP 9.5-1).

➔(DRN 99-2027, R11)
i) A Year 2000 (Y2K) complaint satellite communication system is available. This system, which will function during a LOOP, is a backup to the existing communication system. The handsets are permanently located in the Control Room but the portable antenna is kept in storage until the system is placed in service.
🡐(DRN 99-2027, R11)

The communications systems are shown on Figures 9.5-1 (for Figure 9.5-1, Sheet 3, refer to Drawing G290, Sheet 5), 9.5-2 and 9.5-8.

9.5.2.2.1 Intraplant Communication

➔(EC-43424, R307)
The Private Automatic Branch Exchange (PABX) Telephone System supports at least thirty simultaneous conversations on a dial-up basis between extension stations located strategically throughout the plant areas. The telephone switching equipment is a modern electronic type with built-in safeguards and annunciation signals. Its design is modular and utilizes plug-in type components. The telephone operator can check through the consoles the status of the system. Any malfunction can be easily detected and usually corrected by replacing the affected module. If a line is severed or shorted it will be automatically isolated by the switch until it's repaired and the rest of the system will continue to function normally. In case of system malfunction (including power failure), the telephone switch sends an annunciation alarm signal to the control room. Desk, wall and weatherproof-type telephone instruments are installed as required and connected to the main switching unit with shielded cable. Telephone instruments are the pushbutton type. Each PABX extension station has access to all telephones in the plant. Telephone calls from the plant into the South Central Bell System can be made from designated unrestricted service phones. The central switching unit is located in a limited access, air conditioned communications equipment room in the Reactor Auxiliary Building (elevation +7 ft. MSL).
🡐(EC-43424, R307)

The paging system includes precompressor amplifiers and power amplifiers feeding four 70 volt independent audio and signal transmission lines. The preamps and power amplifiers are monitored by a supervisory signal, the active tone generator is also supervised. Failure of any of these components is detected and annunciated in the main control room.

The output of the power amplifiers is distributed to the loadspeakers via four independent transmission lines (channels). To improve system reliability the speaker load is divided evenly into ten zones. Each zone is covered by two channels. These two channels are connected to different precompressor amplifiers diversification is carried further by connecting speakers on alternate channels. Failure of a precompressor amplifier will mute half of the speaker system, malfunction of a power amplifier will only affect 25 percent of the speakers. The paging system is provided with a spare power airplifier and precompressor amplifier that is manually switched into operation should an active amplifier or preamplifier fail, thus restoring total coverage. Annunciation is provided in the event that any amplifier output signal is interrupted.

The Maintenance Support Building has its own paging system. It is powered by two 2-channel amplifiers and receives its signal from the plant's paging system. The speakers are arranged such that if a single failure was to occur, all areas would still be covered. Power is provided from a local uninterruptable power system.

If a transmission line is severed, speakers connected past the sever point are lost. If a line is shorted, the whole channel is lost.

Site alarm signals are generated by one of two tone generators. The tone generators are arranged such that one generator is active and the other is stand-by. If the active generator fails, the stand-by generator will be manually connected and an annunciation signal will be sent to the control room. The tone generator signals are fed to the paging amplifiers and broadcasted through the loudspeaker system covering the entire site. To provide communication between the main control room and technicians adjusting remote instrumentation and performing other routine maintenance, 11 dedicated sound powered headset intercom circuits are installed.

By segmenting this system, it is practical to have several teams working simultaneously. These 11 circuits are terminated in the patchboard terminal panels which are located in the main control room, computer room and remote shutdown room. Plug-in patches allow temporary circuit interconnections at these panels whenever there is a need for it. Each circuit consists of a two-conductor shielded line interconnecting two or more remote stations. A jack is provided at each remote station, into which the portable headset equipment can be plugged. This arrangement allows for handsfree operation and requires no amplifiers or power source. This system also serves as backup to the normal communication system (PABX).

If a circuit cable is severed producing an open circuit, the jack stations connected past the severed point will be lost; if the wires are shorted, communication in that circuit will be lost.

The soundpowered system is a simple system, it does not require a power supply and component reliability is high. A damaged headset is easily replaced and the jack stations and patchboard terminal panels are highly reliable devices.

➔(EC-43424, R307)
The operation and maintenence radio system has two modes of operation: one-way (paging) and two-way. The base station can be used as a repeater for portable-to-portable and portable-to-base station communication.
🡐(EC-43424, R307)

The O&M radio system utilizes the FM band operating on different frequencies in the 450-475 MHZ spectrum; the base stations are remotely controlled and monitored from their consoles and are licensed by the FCC. An antenna system is provided for interior building radio signal coverage. For offsite radio communication there is a two-way base station that operates on LP&L's assigned FCC frequency in the 25-50 MHZ spectrum. This will provide communication with the Sheriffs and Civil Defense offices for signals initiated at the site. Monitor receivers are provided to receive signals transmitted by the Sheriff or Civil Defense on their respective assigned frequency.

The radio base stations and ancillary equipment (excluding the Civil Defense) are located in a protected area. The Civil Defense radio and its antena are located off-site. Component failure probability is quite small and the system requires minimum wiring. Should the control or transmission lines be faulted, depending on the faults location a portion of the subsystem will be operable.

The working stations on the plant site where it may be necessary for plant personnel to communicate with the main control room or the remote shutdown room during and/or following transients and/or accident (including fires in order to mitigate the consequences of the event and to attain a safe cold plant shutdown are shown in Table 9.5-6.

The following criteria is used to maintain reliable, distinct, and clear communication between the Control and Remote Shutdown Rooms and the referenced working stations having the indicated background and/or maximum noise levels:

a) Areas with noise levels above 100 Decibels, dB(A)

   1) For the telephone station a sound-proof booth or waist-high acoustical shield and a noise cancelling microphone in the handset instrument are provided.

   2) Visual indication via an amber flashing beacon activated upon initiation of a fire or site evacuation alarm from the Control Room or the remote shutdown room alarm panel.

   3) The sound powered headset used in these areas, is provided with a noise shielded microphone.

   4) Portable handheld radios can be provided with plug-in type headsets furnished with noise shielded microphones, as required.

b) Areas with noise levels between 80 and 100 Decibels dB(A).

   1) Telephones are provided with noise cancelling microphones. Each station will be evaluated to determine if a waist-high acoustical shield is required.

   2) The paging system coverage is reinforced by providing one or more of the following features:

      i) Paging loudspeakers equipped with line matching transformers, which allow a choice of power output.

      ii) Locating the loudspeakers closer together and, where physically possible, nearer to locations where personnel will be working.

iii) Visual indication via an amber flashing beacon activated upon initiation of a fire or site evacuation alarm from the Control Room or the remote shutdown room alarm panel.

3) Sound powered headsets are provided with a boom microphone designed to operate within this noise level range.

4) Portable handheld radios can be provided with plug-in type headsets furnished with boom microphones as required.

c) Areas with noise levels below 80 Decibels, dB(A).

Communication facilities at working stations located in these areas will be individually evaluated to determine if there is a need to provide them with special equipment as noted in paragraph b above, otherwise standard type communication instruments will be furnished.

The following communication facilities are provided at or close to each of the above referenced working stations:

a) A telephone station

b) A paging speaker

c) A sound powered jack station

d) Radio communication will also be available to those working stations that are able to receive radio signals. An interior antenna system to supplement the external antenna system for inside buildings radio signal coverage is provided for this purpose.

The following high noise areas will be provided with emergency notification to personnel in the form of visual indication via an amber flashing beacon light that is activated, upon initiation of a fire or site evacuation alarm, from the control room or remote shutdown panel:

a) Emergency Feedwater Pump Room A & B
b) High Pressure Safety Injection Pump Room A & B
c) Shutdown Heat Exchanger Rooms A & B
d) Charging Pump Room A, AB & B
e) Diesel Generator Room A & B
f) Component Cooling Water Pump Room A, AB & B

The telephone, O&M radio, and paging subsystems are supplied 120V ac power from independent circuits of the plant static uninterruptible power system (SUPS) 3AB.

Besides the reliability provided with each subsystem, the strength of the onsite communication system lies in the overlapping coverage given by the subsystems, where the likelihood of simultaneous failure is minimal.

9.5.2.2.2 Offsite Communication

→(DRN 99-2027, R11)
During normal operations, offsite telephone service is provided to the plant by the Southern Central Bell central office trunks. In the event that commercial telephone service is lost, an emergency communications link will be set up from the main control room, the central alarm station and/or secondary alarm station via the two-way radio system and/or LP&L's microwave system, which are both available to the plant. In addition, a Year 2000 (Y2K) compliant satellite system is available for emergency communication. This backup system allows Operations personnel to transmit and receive telephone calls in the Waterford 3 Control Room.
←(DRN 99-2027, R11)

The Waterford 3 microwave system is an extension of existing LP&L's microwave system for Waterford 1 & 2 and provides five voice channels interfaced with Waterford 3 PABX system.

9.5.2.3 Inspection and Testing

The systems provided assure reliable intraplant and offsite communications for normal and emergency conditions. Preventive and corrective maintenance programs will be implemented by the power plant operator. Communication equipment purchasing specifications require vendors to furnish complete operating and maintenance instructions for power plant personnel use. All systems are to be inspected regularly and undergo operational checks to ensure service readiness.

→(DRN 06-233, R14-B)
Communication system protective measures are in some cases built into the equipment, in other instances they are provided in the design of the subsystems. The wiring is sectionalized by areas, floors and/or building to facilitate troubleshooting. Further, the basic systems (PABX and loudspeaker paging) are monitored by control room annunciators.
←(DRN 06-233, R14-B)

9.5.2.4 Instrumentation

The following are annunciated in the control room:

a) loss of power to the PABX Telephone System and

b) loss of output of any of the paging preamps and power amplifiers and/or the site alarm generator.

9.5.3 LIGHTING SYSTEM

9.5.3.1 Design Bases

Lighting systems are designed to provide illumination levels consistent with those recommended for electric generating stations by the Illuminating Engineering Society and meet or exceed OSHA requirements.

The lighting systems and their power sources are designed to provide sufficient illumination to enable the plant operators to perform all manual operations required during normal and emergency plant operation and to move safely through essential areas of the plant.

9.5.3.2 System Description

Plant lighting is divided into three separate subsystems which are defined as follows:

a) normal ac lighting, with power supplied from the normal plant auxiliary system buses,

b) normal/emergency ac lighting, with power supplied from the two ESF divisions, and

c) emergency dc lighting, with power supplied from the ESF dc batteries or battery packs as described below.

Normal and normal/emergency ac lighting systems are energized continuously from 480V Motor Control Centers (MCCS) through 3-phase 480-208Y/120V dry type transformers which supply local area lighting panels. Normal ac lighting is provided in all areas except the main control room. Where continuity of lighting is essential to safe operation or shutdown of the plant, normal/ emergency ac lighting is used in addition to normal lighting (approximately 20 percent of the total plant illumination). Normal/emergency ac lighting is the source of normal operating lighting in the main control room, with dc lighting available as a backup.

Each of the two normal/emergency ac lighting panels for the main control room has two bus sections, normal and emergency. The emergency bus section is supplied from a safety-related MCC and supplies part (about 10 percent per panel) of the lighting at all times. The normal bus section as energized through the tie contactor as long as the emergency bus section is energized, and supplies about 40 percent per panel of the total lighting.

Loss of power to the emergency bus section (e.g., through loss of offsite power) will disconnect the normal bus section by deenergizing the contactor. When power is restored (e.g., by diesel-generator supply) the normal bus section may be reconnected manually.

One half of the main control lighting is supplied by a lighting panel connected to Division A and the other half is supplied from Division B. Failure of supply from the one MCC still leaves sufficient lighting for plant operation. Failure of either or both ac supplies results in energization of the dc lighting, which provides sufficient illumination for plant shutdown and other essential services.

→(EC-23470, R305)
All ac lighting is high intensity discharge, fluorescent, or LED, except areas such as the containment, where incandescent lighting is essential.
←(EC-23470, R305)

→(DRN 03-993, R13)
The dc Emergency Lighting System provides illumination during loss of the Normal Emergency (ac) lighting sources in the main control room only. The lighting system consists of two completely separate and redundant systems, each powered from one of the ESF 125V dc batteries.
←(DRN 03-993, R13)

→(DRN 02-1071, R12-A; 03-993, R13)
During loss of offsite power, self-contained storage battery lighting fixture assemblies provide illumination in areas where plant operators are required to perform emergency functions for hot safe shutdown and for access to and egress from the areas as required by 10CFR50, Appendix R.
←(DRN 02-1071, R12-A; 03-993, R13)

The dc lighting system uses incandescent lamps.

All lighting systems supplied by the ESF buses, both ac and dc are designed with due regard to separation of raceways, fixtures, and panels so that the independence of redundant ESF divisions is not jeopardized. There is a normal/emergency ac and a dc lighting system on each ESF division.

9.5.3.3 Failure Analysis

Lighting in any area which is essential to safe plant shutdown is provided by two ac systems, backed up by two dc systems. In the main control room, the dc is supplied from the ESF 125V dc batteries. Because each ESF division supplies part of both the ac and dc systems, a single failure cannot degrade the essential lighting below a safe level.

9.5.4 DIESEL GENERATOR FUEL OIL STORAGE AND TRANSFER SYSTEMS

9.5.4.1 Design Bases

The Diesel Generator Fuel Oil Storage and Transfer System is designed to:

a) provide oil storage capacity in each storage tank for seven days operation of one diesel generator to meet the engineered safety feature load requirements following a loss of offsite power and a design basis accident,

b) maintain fuel supply to at least one diesel engine assuming a single active or passive failure,

c) withstand safe shutdown earthquake loads without loss of function, and

d) withstand tornado wind loading and maximum flood levels without loss of function.

→ (DRN 00-0670, R11; 03-635, R12-C)
All safety related portions of the Waterford 3 diesel engine fuel oil storage and transfer system, are seismic Category I, safety class 3, and designed to ANSI Standard N195-1976, “Fuel Oil Storage System for Standby Diesel Generator,” with the exceptions as listed below:
←(DRN 03-635, R12-C)

a) The Waterford 3 Emergency Diesel Generator (EDG) Fuel Oil Storage Tanks (FOSTs) contain a seven-day fuel oil supply using the time dependent method for calculating stored fuel oil. The Waterford 3 EDG FOSTs do not contain an explicit allowance for margin.

b) The Waterford 3 EDG FOSTs do not contain an explicit allowance for fuel consumption required for periodic testing.

c) The Waterford 3 EDG fuel oil feed tank suction is located on the botton of the feed tank.

d) The Waterford 3 EDG fuel oil feed tank overflow discharges to the sump pump system.

e) The Waterford 3 EDG fuel oil transfer system does not have a pressure indicator located at the discharge fo the fuel oil transfer pumps.

← (DRN 00-0670, R11)

Protection of the Diesel Generator Fuel Oil Storage and Transfer System from wind and tornado effects is discussed in Section 3.3. Flood design is discussed in Section 3.4. Missile protection is discussed in Section 3.5. Protection against dynamic effects associated with the postulated rupture of piping is discussed in Section 3.6. Environmental design is discussed in Section 3.11.

9.5.4.2 System Description

The Diesel Generator Fuel Oil Storage and Transfer System is shown schematically in Figure 9.5-3. Table 9.5-1 contains design parameters for the system components.

This system provides adequate storage of diesel fuel oil and supplies it to the two emergency diesel engines. Diesel fuel oil storage for each diesel engine is separate and independent of each other. All system components are located in the Reactor Auxiliary Building.

Two completely redundant trains are provided, each consisting of a diesel oil storage tank, transfer pump, diesel oil feed tank, interconnecting; piping, valves and instrumentation and controls. Train A normally serves emergency diesel engine A and train B normally serves diesel engine B. All necessary electrical power for the operation of each train is supplied from the associated emergency diesel generator bus.

→(DRN 03-635, R12-C)
The capacity of each diesel oil storage tank is sufficient for seven days operation of one emergency diesel generator with loading as shown in Table 8.3-1. Interconnecting piping with two normally closed series valves is provided between the two storage tanks to enable either of the emergency diesel engines to be supplied from either of the tanks should one of the transfer pumps fail. Thus a 14 day total diesel oil inventory will be available onsite for single emergency diesel generator operation with loading as shown in Table 8.3-1. Fuel delivery to the plant is by truck. Adequate sources of diesel oil exist within a thirty mile radius. Under extremely unfavorable environmental conditions it is possible to deliver diesel oil by railroad or river barge.

The diesel oil storage tanks are located in two separate rooms, designed to seismic Category I requirements. These tanks are filled through the fill lines located outside the rooms. The diesel oil transfer pumps, one located in each storage tank room, take suction from the tanks and discharge into the diesel oil feed tanks. Strainers are installed in suction lines to prevent particulate matter from entering the pumps.

The diesel oil feed tanks have capacity sufficient for a period of approximately two hours with emergency diesel generator unit operating at full load. The feed tanks are located in separate rooms at elevation +46.00 ft. MSL in the Reactor Auxiliary Building. Excess oil from each emergency diesel engine is gravity drained back to its respective storage tank.
←(DRN 03-635, R12-C)

A sump equipped with a duplex pump unit is located in each storage tank room to handle any oil spill. Oil is pumped to an oil separator sump in the yard area near the Turbine Building.

The exterior and interior surface of the tanks are blast cleaned, then they are entirely coated to prevent corrosion. All piping is also cleaned and painted to protect against corrosion. A corrosion protection system for the outside surfaces of the piping and tanks in the form of an impressed current system is not required. All piping and tanks are either above ground or encased in concrete.

9.5.4.3 Safety Evaluation

The Diesel Generator Fuel Oil Storage and Transfer System provides two independent sources of diesel oil supply. Physical and electrical separation of components assure that the system can withstand a single failure. Tanks, pumps and piping are so arranged that the malfunction or failure of either active or passive components in one train will not impair the ability of the other train to function. Electrical power is supplied through two separate engineered safeguards features channels so a single failure will not result in loss of independent sources of fuel supply. A failure mode and effects analysis is provided in Table 9.5-2.

All fuel oil piping is of welded construction to minimize leakage. The fuel oil piping is routed away from possible ignition sources such as high energy electrical lines and hot surfaces such as the diesel exhaust lines. In addition all hot surfaces in the diesel generator room are insulated. Due to the diesel generator design there are no open flames in the diesel generator room. The atmospheric vents from diesel oil storage tanks and fuel oil feed tanks are fitted with flame arrestors to prevent ignition of the fuel from an external spark. Drain lines 7EG1-43 and 7EG1-44 have a maximum expected flow of 1/2 gallon per hour of engine operation and are non-pressurized gravity feed lines. Therefore, leakage from these lines is not considered a fire hazard.

→(DRN 01-567, R11-A)
The flame arrestors contain internal filters which protect the portion of the feed tanks vent piping located outside the Reactor Auxiliary Building from entering debris.
←(DRN 01-567, R11-A)

Each fuel oil storage tank is provided with a distribution pipe inside the tank as shown on Figure 9.5-3 to minimize creation of turbulence of the sediment in the bottom of the fuel oil storage tank.

An emergency, seismic Category I, ASME III, Code Class 3 fill connection for the Diesel Fuel Oil Storage Tanks is located on the cross-tie between Train A and Train B as shown on Figure 9.5-3a. Emergency venting for these tanks is provided by opening the manhole cover on the affected tank.

9.5.4.4 Testing and Inspection

The tests and inspection performed for the fuel oil transfer pumps at the manufacturer's plant include a hydrostatic test, a performance test and a liquid penetrant inspection of the pump casing. The feed tanks are hydrostatically tested at the manufacturer's plant. The fuel oil storage tanks are hydrostatically tested at the site after installation.

All instruments are calibrated during preoperational testing. Post operational testing is conducted in accordance with the technical specifications (see Subsection 3/4.8.1).

9.5.4.5 Instrumentation Application

Each fuel oil transfer pump may be controlled manually from a switch at the local control panel, but is normally controlled automatically by the oil level of its corresponding feed tank. The pump is started automatically by a low level switch in the feed tank and stopped by a high level switch, with status indication in the main control room. Manual capability is provided for filling both feed tanks from either pump. Storage and feed tanks' oil levels are indicated locally. Feed tank oil level is indicated in the main control room; also an alarm is given on low-low level. Storage tank high and low levels are also alarmed in the main control room.

9.5.5 DIESEL GENERATOR JACKET WATER COOLING SYSTEM

9.5.5.1 Design Basis

The Diesel Generator Jacket Water Cooling System is designed to:

a) supply clean water to the diesel engines in order to maintain proper operating temperatures under all loading conditions,

b) withstand shutdown earthquake loads without loss of functions,

c) assure that a single failure of any system active component, assuming a loss of offsite power, cannot result in a complete loss of functional capability of the diesel generators,

d) maintain the diesel generator cooling water in a warm condition to promote starting, and

e) withstand the environmental conditions that the diesel generators are exposed to.

The Diesel Generator Jacket Water Cooling System is designed to safety class 3 and seismic Category I requirements.

9.5.5.2 System Description

The Diesel Generator Jacket Water Cooling System is shown in Figure 9.5-4. Components design parameters are given in Table 9.5-3.

The jacket water cooling system is a closed loop system and has an individual heat removal rate of 4,718,000 BTU/Hr @ 4840 kw. The standpipe is initially filled by the component cooling water makeup pumps. The jacket cooling water circulating pump is an engine driven centrifugal pump, designed to provide cooling water during all diesel engine loadings. The pump draws water from the bottom of the standpipe and discharges through a heat exchanger before entering the diesel engine cooling passages. Each diesel engine cylinder liner is surrounded with a carbon steel jacket. The liner adjacent to the jacket is machined to provide circumferential and axial passages for cooling water flow. After passage through the engine, the hot water collects in a header and flows back to the upper part of the standpipe.

A three-way temperature controlled valve controls the flow either through the heat exchanger or to the bypass around the heat exchanger to maintain the jacket cooling water at a nominal temperature of 175°F. The valve is designed such that if a failure to the controller was to occur, full flow would be passed through the heat exchanger.

The standpipe serves two purposes; besides being the storage tank for the system, it also absorbs the changes in cooling water volume as the diesel engine heats up and cools down. Makeup from the component cooling water makeup pumps to the system is controlled by a solenoid operated valve initiated by the stand pipe level controller. The solenoid valves are designed to fail in an open position, so that there will always be water available to the standpipe.

During periods of diesel generator standby, the jacket water cooling system is automatically maintained between 120°F and 130°F by means of an electric jacket water circulation heater and a motor driven jacket water circulation pump (see Figure 9.5-4).

A portion of the jacket water flow is diverted from the engine inlet headers to the turbocharger, combustion air heaters, and the governor oil cooler. The jacket water warms the air in the combustion air plenums and the oil in the governor housing when an engine is in the "standby mode." This warming process enhances the initial starting ability of the diesel engines.

The corrosion of the jacket water cooling components is reduced by the use of demineralized water and corrosion inhibiter. The engine is designed such that no water will be in contact with the fabricated cylinder block, thus eliminating block damage from corrosion. All parts of the engine system in contact with the cooling water are readily removable to facilitate maintenance and repair.

9.5.5.3 Safety Evaluation

→(DRN 03-635, R12-C)
The Diesel Generator Jacket Water Cooling System is designed to have adequate capability to carry away the waste heat from diesel generator units under all loading and ambient conditions. The diesel generator is capable of operating fully loaded without secondary cooling for a minimum of one minute. Sufficient water is contained in the engine and standpipe to absorb the heat generated during this period. Component cooling water pumps which supply cooling water to the diesel generator cooling system are in continuous operation except for a period of approximately 17 seconds after initiation of a loss of offsite power or loss of offsite power and a SIAS signal.
←(DRN 03-635, R12-C)

All components of the Diesel Generator Jacket Water Cooling System are designed to seismic Category I and safety class 3 requirements. All electrical components are Class 1E. The system components are protected from hurricane, tornado winds, external missiles and flooding by their location in the Reactor Auxiliary Building.

Diesel Generator Jacket Water Cooling System components for each diesel generator are located in the room of that diesel generator. There is no interconnecting piping between the systems. The piping is arranged so that the piping for one system does not pass through the other diesel generator room. If a single active failure occurs in the cooling water system of one diesel generator, the other diesel generator is available and is capable of bringing the plant to a safe shutdown.

→(DRN 03-635, R12-C)
Failure of the jacket water circulation heater is annunciated by a coolant off normal temperature alarm, indicating low temperature. Failure of the heater will not prevent the diesel generator unit from starting.

The Jacket Water Cooler is designed with a fouling factor which gives some margin for heat removal.
←(DRN 03-635, R12-C)

9.5.5.4 Tests and Inspection

Testing of the diesel generator is discussed in Subsection 8.3.1.1. Visual inspection, pressure and leak testing, including operational checks of the cooling system components are performed before the unit is installed. The diesel generator cooling water system is operationally checked during the periodic testing of the diesel generator system. The water warming system is operationally checked during diesel generator shutdown periods.

9.5.5.5 Instrumentation Application

The following alarm points with local annunciation are provided in the jacket water cooling system for each diesel generator:

a) jacket water temperature off normal,

b) jacket water high temperature,

c) standpipe low level, and

d) jacket water low pressure.

Operation of any one of the above local alarms activates a DIESEL ENGINE TROUBLE alarm in the control room. Level switches are provided to control the water level in the standpipe. The solenoid valves in the makeup line are opened at low level and closed at high level. In addition, pressure and temperature devices are provided for local indication and thermocouples are provided for remote indication of temperature. One thermocouple is placed in the piping between the return header and standpipe and the second thermocouple placed in the piping between the heat exchanger and the diesel engine. A high temperature switch set at 205°F rising will shut down the diesel generator provided no engineered safety features signal is present.

9.5.6 DIESEL ENGINE STARTING SYSTEM

9.5.6.1 Design Bases

The Diesel Engine Starting System is designed to:

a) store and provide a sufficient quantity of compressed air to start the diesel generator set,

b) withstand safe shutdown earthquake loads without loss of function,

c) provide starting of its associated diesel generator set, assuming a single active failure and a loss of offsite power, and

d) operate under the same environmental conditions as the diesel generator which it serves.

The air receivers, piping and valves from the receivers through the diesel engine are designed to Safety Class 3 and seismic Category I requirements (refer to Table 3.2-1).

9.5.6.2 System Description

The Diesel Engine Starting System is shown in Figure 9.5-5. Design data for the air compressors, air dryers, air receivers, piping and valves are given in Table 9.5-4.

→(EC-5000082405, R301; EC-31660, R305)
Each diesel generator has two starting air systems; two compressors and two air receivers. Each starting air compressor takes suction from the room through compressor mounted air filters, and discharges into its respective air receiver after passing through an air dryer assembly. The air dryer assembly is a desiccant type and includes both a prefilter and after-filter so that the air stored in the receiver is essentially free of moisture and impurities. Both compressors, when operating simultaneously, will recharge both receivers within 120 minutes.
←(EC-5000082405, R301; EC-31660, R305)

→(DRN 03-635, R12-C, LBDCR 14-017, R309)
The two compressor discharges for each diesel engine are cross-connected. A normally closed valve is provided in this line. Therefore, either compressor has the capability of filling both receivers. Each air receiver is equipped with a safety valve, a drain valve, and isolation valves. Each air receiver tank has a pressure switch to automatically start its compressor when air pressure becomes low and stop its compressor when air pressure has recovered.
←(DRN 03-635, R12-C, LBDCR 14-017, R309)

Each air receiver is connected to the diesel engine starting mechanism independently. The parallel air supply lines from the air receivers are interconnected downstream of the starting air valves to permit air flow from either air receiver to each bank of diesel engine cylinders. Adequate cranking power is obtained from either of the air receivers so that the failure of one starting air valve to open will not prevent starting.

→(DRN 00-691, R11-A; 02-89, R11-A)
Upon receipt of a diesel generator start-up signal, both starting air systems are activated and air from both air receivers is delivered simultaneously to the two starting air valves. Four solenoid valves (two per starting air valve) react to open the starting air valves. Air is passed through both the header and the starting air distributors concurrently. The pilot air in the starting air distributors operates 16 individual air injection valves which introduce air into the cylinders for cranking in accordance with the firing sequence. There are no "dead" spots, that is, the system is completely overlapping and as a result a cylinder is always being filled with air. Each starting air valve delivers air to one bank of cylinders as shown in Figure 9.5-5, however, if one starting air valve fails, the other will provide sufficient starting air to both cylinder banks. In addition each solenoid valve is capable of opening its respective starting air valve for air delivery to the headers. As a result, failure of up to three solenoid valves will not prevent delivery of sufficient starting air for diesel engine-generator start-up under emergency conditions.
←(DRN 00-691, R11-A; 02-89, R11-A)

→(DRN 00-691, R11-A; 02-89, R11-A)
←(DRN 00-691, R11-A; 02-89, R11-A)

The control valves are opened by the diesel generator starting signal which may be either manual or automatic, as described more fully in Subsection 8.3.1.1.2.13.

Air can also be supplied to the turning gear motor at the fly wheel end of the diesel engine during diesel generator maintenance. During that time the diesel generator is unavailable for starting.

A portable diesel driven air compressor is available to charge an air receiver in the event electrical power is lost to the installed compressors.

9.5.6.3 Safety Evaluation

→(DRN 03-635, R12-C)
Each diesel generator is equipped with two air compressors, air dryers, and air receivers, either set of which is capable of starting the diesel engine. The diesel generator may be started automatically as in an emergency, or manually, by the operator. Each of the two receivers is sized to store enough air to crank and start the engine five times, based on an air receiver pressure of 240 to 260 psig, without the use of the air compressors when starting manually. If engine speed does not increase beyond 280 RPM (i.e., engine fails to start), a time delay relay cuts off starting air after engine cranks for 25 seconds, and initiates the "sequence incomplete" action which shuts down the diesel generator only during the test mode. The operator may attempt another start immediately by first pushing the "system reset" button, and then operating the engine "start" control switch.
←(DRN 03-635, R12-C)

All emergency (LOVS or ESFAS) starting operations are automatic and selfinitiated. The system is designed to start the diesel engine in such a time that the diesel generator can reach rated speed and voltage in a maximum of 10 seconds. Engine cranking will continue on starting air until engine starts or air supply is exhausted.

→(DRN 03-635, R12-C)
←(DRN 03-635, R12-C)

→(DRN 03-635, R12-C)
Air compressors are designed to API. Air Dryers are designed to ASME Section VIII. The interconnecting piping and piping from the dryers to the receivers are designed to ANSI B31.1. The air compressors are designed to Seismic Category I while the dryers and piping are designed to Seismic Category II. Air receivers and connecting piping and valves from receivers to engines are designed to ASME Section III Class 3 requirements. The receivers and downstream piping are designed to Seismic Category I.
←(DRN 03-635, R12-C)

The starting air system is protected from hurricane and tornado winds, external missiles, and flooding by virtue of its location inside the diesel generator rooms. Since the starting air systems are located separately in the diesel generator rooms they serve, internally generated missiles from one diesel generator will not affect functioning of the other starting air systems.

Any single active failure of any starting air system component of the diesel generator set will not affect the diesel generator which it serves. There are no interconnections between starting air systems of redundant diesel generator sets.

9.5.6.4 Tests and Inspection

Testing of the diesel generator is discussed in Subsection 8.3.1.1. The starting air compressors for each diesel engine are test-started periodically to assure continued operability. Compressor suction air filters are periodically checked for cleanliness. During the preoperational testing of the diesel generator, the compressed air starting systems were operated to ensure 100 percent capability, and were tested to demonstrate the capability of the air receiver to store sufficient air to start the diesel five consecutive times at a nominal pressure of 250 ±5 psig per air receiver and verify the recovery rate of the compressors.

9.5.6.5 Instrumentation Application

The following instruments are provided in the starting air system for each diesel generator:

a) pressure switches on each air receiver which control the operation of the corresponding compressor, and

b) local pressure indicator on each air receiver.

The following alarm points are provided in the starting air system, with local annunciation:

a) starting air system low pressure (each receiver).

b) starting air system malfunction (low air receiver pressure, starting air solenoid failure, starting air valve failure) and

c) turning gear engaged. When the turning gear is engaged for maintenance, the diesel engine cannot start and therefore is annunciated.

Operation of any of these alarms actuates the DIESEL ENGINE TROUBLE alarm in the main control room.

9.5.7 DIESEL GENERATOR LUBRICATION SYSTEM

9 5.7.1 Design Bases

The Diesel Generator Lube Oil System is designed to:

a) supply sufficient lubricating oil to the diesel generator main bearings, thrust bearings and engine accessories for the proper operation of the diesel generator set during diesel generator operation and shutdown,

b) withstand safe shutdown earthquake loads without loss of function,

c) withstand a single active failure of any component, assuming loss of offsite power, without resulting in a complete loss of functional capability of the diesel generators, and

d) perform its function under the same environmental conditions as the diesel generator which it serves.

The components required for safety are designed to safety class 3 and seismic Category I requirements.

9.5.7.2 System Description

The Diesel Generator Lube Oil System is shown in Figure 9.5-6. Design parameters for system components are provided in Table 9.5-5.

→(DRN 03-635, R12-C)
The system has an individual heat removal rate of 1,940,000 BTU/Hr @ 4840 kw and consists of the following equipment (per diesel engine generator set):
←(DRN 03-635, R12-C)

a) one engine driven pump,

b) one motor driven standby pump,

c) two lube oil coolers,

d) one lube oil strainer,

e) lube oil filters,

f) one lube oil circulation and prelube pump,

g) one lube oil electric heater, and

h) piping, valves and instrumentation.

A common maintenance lube oil storage tank (1250 gal.) is provided for both diesel generators. This is a nonsafety, nonseismic tank originally intended to be used for the storage of lube oil during the maintenance of a diesel generator. Due to the location of the lube oil storage tank in relation to the Emergency Diesel Generator "B" air intake pipe, the lube oil storage tank is not used. The Lube Oil Storage Tank is located on the roof of the RAB approximately 4 feet west of Emergency Diesel Generator "B" 30 inch diameter intake air pipe.

→(DRN 03-635, R12-C)
The main circulating lube oil pump is an engine driven rotary gear type pump which takes its suction from a lube oil sump located at the base of the emergency diesel engine through a strainer and circulates oil while the diesel engine is running. It is pumped through lube oil coolers, filters and strainer before it flows to the diesel engine bearings. The filters and strainers are capable of filtering out particulates greater than 16 microns and 76 microns, respectively. A three-way temperature controlled valve is installed upstream of the lube oil coolers which controls the amount of oil that flows through the coolers to maintain the lube oil at a nominal temperature of 165°F. Heat is rejected to the Component Cooling Water System, discussed in Subsection 9.2.2.
←(DRN 03-635, R12-C)

During periods of diesel generator standby the lubricating oil is kept at the proper operating temperature by circulating it with a motor driven circulation and prelube pump through an automatically controlled electric heater. This assures optimum viscosity and lubricating properties. The lube oil circulation and prelube pump will run continuously when the diesel engine is less than 280 rpm.

To reduce wear on moving parts which would occur during diesel engine startup before oil pressure is established, a 100 percent capacity motor driven standby pump is provided. Operation of this pump is not required in emergency start conditions. This pump can be used should the engine driven pump fail for any reason.

9.5.7.3 Safety Evaluation

The Diesel Generator Lube Oil System is capable of supplying sufficient lubrication to the diesel generators under all loading conditions. All components of this system required for safety are designed to seismic Category I and safety class 3 requirements.

Because of the arrangement and redundancy of emergency diesel generator design, a failure of any single active component of the diesel generator lubrication system cannot result in a complete loss of functional capability of the diesel generators. Alternately considered, a single failure may be assessed as a failure of the diesel generator with which it is associated. A safe shutdown can be maintained by the redundant diesel generator.

→(DRN 03-635, R12-C)
The diesel engines are provided with Crankcase Relief Valves and Flame Arresters to prevent crankcase explosions and resultant fire. These pressure relief valves are designed to relieve primary explosion with quick and frictionless movement. Also, a dry type flame arrester is mounted on the outside of the engine. In addition, secondary explosions are prevented by eliminating the inrush of fresh air through immediate closing and positive sealing of the valve plate.
←(DRN 03-635, R12-C)

The system is protected from tornado winds, externally generated missiles and flooding by virtue of its location inside the diesel generator rooms. As each lube oil system associated with its diesel generator is located in that diesel generator room with no interconnecting piping, missiles generated by one diesel generator will not damage the lube oil system associated with the other diesel generator.

→(DRN 03-635, R12-C)
The Lube Oil Cooler is designed with a fouling factor which gives some margin for heat removal.
←(DRN 03-635, R12-C)

In order to prevent entry of deleterious materials into the Engine Lubrication Oil System, the fill connection is provided with a threaded cap maintained in place except during oil addition. Additionally, oil containers are maintained sealed while not in use and equipment used for oil addition is controlled by maintenance and cleanliness programs.

9.5.7.4 Tests and Inspection

Testing of the diesel generator is discussed in Subsection 8.3.1.1. The Diesel Generator Lube Oil System is operationally tested during the startup and checkout of the diesel generator. Lube oil pressure and temperature are monitored to ensure operability of the engine driven pump. Operation of the lube oil circulation and prelube pump and electric heater are evidence of their operability. Inspection and testing of the system can be performed without disturbing normal plant operations. The oil itself is checked routinely to ensure that the engine manufacturer's specifications are met.

The complete lubrication system is thoroughly flushed before initial startup to make sure that there is no foreign matter in the system.

9.5.7.5 Instrumentation Application

The following local alarm points are provided in the lube oil system for each diesel generator:

a) engine low oil pressure.,

b) turbo low oil pressure,

c) low oil temperature,

d) engine lube oil temperature off normal,

e) high oil temperature,

f) high differential pressure across filter,

g) engine crankcase low level, and

h) standby lube oil pump running/trouble.

Operation of any of the alarms activates the DIESEL ENGINE TROUBLE alarm in the main control room, but does not shut down the diesel engine. In addition to this, two low pressure switches are provided, one in the lube oil header upstream of the engine bearings and one in the main turbo charger bearings' piping. Theses switches shut down the diesel engine when the lube oil pressure reaches the appropriate setpoint and is falling unless the diesel generator is operating due to loss of offsite power or an Engineered Safety Feature Actuation Signal (ESFAS).

Pressure and temperature devices are provided for local indication. A thermocouple is also provided upstream of the three-way valve for remote temperature indication.

9.5.8 DIESEL GENERATOR COMBUSTION AIR INTAKE AND EXHAUST SYSTEM

The diesel generator combustion air intakes and exhausts are shown on Figure 9.5-7.

9.5.8.1 Design Bases

The Diesel Generator Combustion Air Intake and Exhaust System is designed to supply adequate combustion air to the diesel generators and to exhaust the combustion products to the atmosphere. The combustion air intakes are in a protected recess created by the Reactor Auxiliary Building geometry which protects them from high winds. The combustion air intakes and exhausts are designed to withstand safe shutdown earthquake and tornado forces.

The system meets minimum safety requirements assuming a single failure. For seismic and safety class classifications, refer to Table 3.2-1.

9.5.8.2 System Description

The screened combustion air intakes are located outside the Reactor Auxiliary Building at elevation +46 ft. MSL. A dry type intake filter and silencer for each diesel generator is installed indoors with intake piping of adequate size to prevent excessive pressure drop. The exhaust piping from each diesel generator exhaust outlet to each exhaust silencer, located above elevation +69 ft. MSL, is of sufficient size to prevent excessive back pressure. The exhaust pipes exit the building above the roof elevation at +95.5 ft. MSL.

Expansion joints for exhaust and intake piping are provided to protect the equipment from forces due to thermal expansion or vibration.

The following are the local instrumentation, controls, sensors, and alarms that are provided in the design of the D-G engine combustion air intake and exhaust system to warn operators when design parameters are exceeded:

a) Intake air manifold temperature.

b) Intake air temperature at both cylinder banks. There are both direct and remote temperature readings.

c) Temperature indication at the exhaust of each individual cylinder.

d) Temperature indication in the exhaust manifold.

e) Temperature indication at the exhaust of the turbocharger. There are no alarms provided in this system, nor are any computer inputs provided.

f) Intake air filter high differential pressure. There is a local alarm provided.

9.5.8.3 Safety Evaluation

The combustion air intake to each diesel generator is designed to ANSI B 31.1 and seismic Category I requirements, protected from tornado generated missiles, and shielded from direct wind, rain or snow. Intake filters are provided to remove particulates such as airborne dust. The combustion products exhaust system is also designed to ANSI B 31.1 and seismic Category I requirements. The hot gases are exhausted approximately 50 ft. above the air intakes, thus avoiding the possibility of recirculation of diesel combustion products.

As shown in Figure 9.5-7 the exhaust silencer is inside a concrete room. This room is tornado missile proof and thus provides protection to the silencer. The portion of the exhaust stack that extends above this concrete room is fabricated from heavy wall pipe (nominal thickness - 1 inch). This precludes the possibility of tornado missile damage resulting in loss of function of the exhaust line.

The chemical facilities for the Treatment Building is located more than 250 ft. away from the air intakes. Under any accident or meteorological conditions, there is minimal possibility of diluting the oxygen content of the combustion intake air to such an extent as to prevent the diesel generators from developing full rated power or causing the engines to shut down.

The effects of moderate energy pipe breaks are reviewed to provide assurance that any possible degradation does not jeopardize the system's minimum safety functional requirement.

The pressure drop due to a tornado is taken into consideration in the design of the diesel generator air intake and exhaust flow.

9.5.8.4 Inspection and Testing Requirements

Preoperational and periodic tests and inspections of all system functions will be performed in accordance with plant operating procedures. The regular testing of the diesel-generators themselves proves the integrity of the intake and exhaust systems.

TABLE 9.5-1 (Sheet 1 of 3) Revision 15 (03/07)

DESIGN DATA-DIESEL GENERATOR FUEL OIL STORAGE AND TRANSFER SYSTEM

Diesel Oil Storage Tank

Quantity	2
→(DRN 06-1167, R15) Capacity, gallons (at overflow)	41,579
←(DRN 06-1167, R15) Height, ft.	45.75
Diameter, ft.	12.5
Pressure, psig, Operating/Design	Atmospheric/Atmospheric
→(DRN 03-635, R12-C) Temperature, F Operating/Design	Ambient/125
←(DRN 03-635, R12-C) Material	Carbon Steel
Code	ASME Section III, Class 3 1974 edition, up to and including Summer 1974 addenda

Diesel Oil Feed Tank

Quantity	2
Capacity, gallons (at overflow)	613
Height, ft.	6.5
Diameter, ft.	4.0
→(DRN 03-635, R12-C) Pressure, psig, Operating/Design	Atmospheric/15
Temperature, F Operating/Design	Ambient/125
←(DRN 03-635, R12-C) Material	Carbon Steel
Code	ASME Section III, Class 3 1974 edition, up to and including summer 1974 addenda

Fuel Oil Transfer Pump

Quantity	2
Type	Horizontal-Centrifugal
Fluid Temperature, F Maximum/Minimum	120/50

TABLE 9.5-1 (Sheet 2 of 3) Revision 7 (10/94)

Capacity, gpm	50
Total Dynamic head, ft.	186
Runout capacity, gpm	80
Shut-off head, ft.	201
Speed, rpm	3500
➜ Brake horsepower	5.8
← Efficiency, %	37
Code	ASME Section III, Class 3 1971 edition, up and including winter 1972 addenda
<u>Materials of Construction</u>	
Casing	Carbon Steel SA-216, Grade WCB
Casing Ring	Carbon Steel SA-439, Grade 2
Impeller	Carbon Steel SA-439, Grade 2
Impeller Ring	Carbon Steel SA-439, Grade 2
Shaft	Carbon Steel SAE 4140
<u>Fuel Oil Transfer Pump Driver</u>	
Quantity	2
Type	Electric-Induction motor
Rating/Speed, hp/rpm	7.5/3600
Voltage/phase/frequency, V/ph/Hz	460/3/60
Source of Power/No. Motors	MCC 3A312-S/1, MCC 3B312-S/1
<u>Piping and Valves</u>	
Design Pressure, psig	150
Design Temperature, F	125

TABLE 9.5-1 (Sheet 3 of 3) Revision 305 (11/11)

Piping - 2 in. and under	Schedule 80 wall
Piping - 2-1/2 in. and larger	Schedule 40 wall
Valves - 2 in. and under	600 lb. ANSI
Valves - 2-1/2 in. and larger	150 lb ANSI rating
→(EC-26241, R305) Material (Piping)	Carbon Steel, A106 Grade B or equivalent
←(EC-26241, R305) →(DRN 03-635, R12-C) Code	ASME Section III, Class 3 1971 edition, up to and including winter 1972 addenda for Ebasco furnished ANSI B31.1 for Cooper Bessemer furnished
←(DRN 03-635, R12-C)	

TABLE 9.5-2 (Sheet 1 of 2) Revision 12-C (07/03)

DIESEL GENERATOR FUEL OIL STORAGE AND TRANSFER SYSTEMS
FAILURE MODE AND EFFECTS ANALYSIS

Equipment	Failure Mode	Probable Cause	Method of Detection	Effect on System	Remarks
→(DRN 03-635, R12-C)					
1. Diesel oil storage tanks A or B	a) Leakage	Manufacturing defect	Operator periodic inspection of tank level	Loss of one oil tank	Redundant storage tank with seven day supply available.
→(DRN 03-635, R12-C) ←(DRN 03-635, R12-C)					
←(DRN 03-635, R12-C)					
2. Transfer pump suction strainers 3EG-S634A or 3EG-S635B	a) Plugged	Containment buildup	Fuel oil transfer pump status indication in control room	Loss of suction to one fuel oil transfer pump	Redundant fuel oil transfer pump is available which can feed either of two feed tanks.
	b) Does not strain out contaminants	High perforated strainer element	Periodic Inspection	Probable malfunction of one diesel generator	Redundant 100% capacity diesel generator is available.
→(DRN 03-635, R12-C)					
	c) External leakage	Manufacturing defect	Operator periodic inspection of tank level	Loss of fuel oil transfer path to feed tank	Redundant Fuel oil transfer system is available.
←(DRN 03-635, R12-C)					
3. Transfer pumps A & B	a) Pump or motor failure	Mechanical seal or electrical failure	Pump status indication in control room	Loss of one fuel oil transfer pump	Redundant 100% capacity fuel oil transfer pump is available.
	b) Spurious start of pump	Electrical mal-function	Feed tank level indi-cation in control room	Overflow of feed tank	Functional operability of the system is not diminished.
→(DRN 03-635, R12-C)					
4. Transfer pump discharge check valves 3EG-V601A and 3EG-V602B	Fails in closed position	Mechanical failure, blockage	Feed tank level indication in control room	Loss of one of two fuel oil transfer paths	Other fuel oil transfer path via crossover pipe 3EG2-6A/B is available.
5. Diesel oil feed tanks A & B	a) Leakage	a) Manufacturing defect	Feed tank level indication In control room	Loss of one feed tank and thereby one diesel generator	Redundant 100% capacity diesel generator is available to provide emergency onsite power.
←(DRN 03-635, R12-C)					
		b) Deterioration	Feed tank lo-lo level alarm in control room	Loss of one feed tank and thereby one diesel generator	Redundant 100% capacity diesel generator is available to provide emergency onsite power.
→(DRN 03-635, R12-C)					
	b) Erroneous low	Electrical or mechanical mal-function	Operator periodic testing	Erroneous start of fuel oil transfer pump	Pump stops on high level and redundant fuel oil transfer system is available
←(DRN 03-635, R12-C)					

TABLE 9.5-2 (Sheet 2 of 2) Revision 12-C (07/03)

Equipment	Failure Mode	Probable Cause	Method of Detection	Effect on System	Remarks
→(DRN 03-635, R12-C)					
	c) Erroneous high level indication	Electrical or mechanical mal-function	Operator periodic testing of tank level	Erroneous stopping of fuel oil transfer pump	Redundant fuel oil transfer system is available
→(DRN 03-635, R12-C) ←(DRN 03-635, R12-C)					
←(DRN 03-635, R12-C)					

TABLE 9.5-3 Revision 12-C (07/03)

DESIGN PARAMETERS FOR DIESEL GENERATOR JACKET COOLING WATER SYSTEM

→(DRN 03-635, R12-C)
←(DRN 03-635, R12-C)

Engine Driven Jacket Water Pump

Quantity	1 per Diesel
Flow, gpm	1080
Total dynamic head, ft.	70
Speed, rpm	1750
Code	Manufacturer's Standards

Motor Driven Jacket Water Circulation Pump

Quantity	1 per Diesel
Flow, gpm	175
TDH, ft.	40
→ (DRN 99-0674) Brake horsepower ← (DRN 99-0674)	2.9
Speed, rpm	1750
→(DRN 03-635, R12-C) Code ←(DRN 03-635, R12-C)	ASME III, Code Class 3, Summer 1973 Addenda

Jacket Water Circulation Pump Driver

Quantity	1 per Diesel
Type	Electric-Induction Motor
Rating/Speed, HP/RPM	5/1800
→(DRN 00-703, R11-A) Voltage/Phase/Frequency, V/ph/Hz ←(DRN 00-703, R11-A)	480/3/60
Source of Power/No. Motors	MCC 3A312-S/1, 3B312-S/1

Jacket Water Circulation Heater

Quantity	1 per Diesel
Power, KW	15
Voltage, v	480

TABLE 9.5-4 (Sheet 1 of 2) Revision 308 (11/14)

DESIGN DATA - DIESEL ENGINE STARTING SYSTEM COMPONENTS

AIR COMPRESSOR	
Quantity	2 per Diesel
Type	Reciprocating, air cooled
Capacity, Scfm	32.2
→(DRN 06-843, R15)	
Nominal discharge pressure, psig	250
←(DRN 06-843, R15)	
Discharge temperature, °F	100
→(EC-43474, R308)	
Speed, rpm	932
←(EC-43474, R308)	
AIR COMPRESSOR DRIVER	
Quantity	2 per Diesel
Type	Electric induction motor
→(EC-43474, R308)	
Rating/Speed, HP/RPM	15.0/1800
←(EC-43474, R308)	
Voltage/phase/frequency V/ph/Hz	460/3/60
Source of Power/No. Motors	MCC 3A312-S/2, MCC 3B312-S/2
AIR DRYER	
Quantity	2 per Diesel
Type	Heatless
Flow rate scfm	36
Pressure operating/design, psig	250/300
Temperature operating/design, °F	100/120
Drying Chambers, quantity	2
Dewpoint	-40 °F
Desiccant	Activated alumina
→(DRN 03-635, R12-C)	
Code	ASME Section VIII
←(DRN 03-635, R12-C)	
AIR RECEIVER	
Quantity	2 per Diesel
Type	Horizontal
→(DRN 03-635, R12-C;EC-5000082405, R301)	
Capacity cu ft.	115.5 min. *
←(DRN 03-635, R12-C; EC-5000082405, R301)	
Diameter, in.	36
Height, ft.	8.0
Design pressure, psig	300
Design temperature, °F	120
Material	Carbon steel
Code	ASME Section III, Class 3, 1971 up to and including Summer 1973 addenda

→(EC-5000082405, R301)

* The 115.5 cu. ft. capacity consists of the 65 cu. ft. air receiver and an additional minimum 50.5 cu. ft. from accumulator piping.

←(EC-5000082405, R301)

TABLE 9.5-4 (Sheet 2 of 2) Revision 305 (11/11)

DESIGN DATA - DIESEL ENGINE STARTING SYSTEM COMPONENTS

→(DRN 03-635, R12-C)

PIPING

→(EC-26241, R305)

Pressure, operating/design, psig	250/265
Temperature, operating/design, °F	100/125
Material	Carbon steel A-106, Gr B or equivalent
Code	ANSI B31.1, Manufacturer furnished

←(EC-26241, R305)

ASME Section III, Class 3, Ebasco furnished – 1971 up to and including the Winter 1972 Addenda or ANSI B31.1, 1973

←(DRN 03-635, R12-C)

TABLE 9.5-5 (Sheet 1 of 2)

DESIGN PARAMETERS FOR DIESEL GENERATOR LUBE OIL SYSTEM COMPONENTS

Engine Driven Lube Oil Pump

Quantity	1 per Diesel
Type	Rotary
Flow, gpm	530
Discharge Pressure, psig	90
Code	Hydraulic Institute

Motor Driven Lube Oil Circulation and Prelube Pump

Quantity	1 per Diesel
Type	Rotary
Flow, gpm	120
Discharge Pressure, psig	50
Code	Hydraulic Institute

Lube Oil Circulation and Prelube Pump Driver

Quantity	1 per Diesel
Type	Electric-Induction Motor
Rating/Speed, HP/RPM	10/1200
Voltage/Phase/Frequency, V/ph/Hz	460/3/60
Source of Power/No. Motors	MCC 3A312-S/1, MCC 3B312-S/1

Motor Driven Standby Lube Oil Pump

Quantity	1 per Diesel
Type	Rotary
Flow, gpm	530
Discharge Pressure, psig	90
Code	Hydraulic Institute

Standby Lube Oil Pump Driver

Quantity	1 per Diesel
Type	Electric Induction Motor
Rating/Speed, HP/RPM	50/900
Voltage/Phase/Frequency, V/ph/Hz	460/3/60
Source of Power/No. of Motors	MCC 3A312-S/1, MCC 3B312-S/1

Lube Oil Heater

Quantity	1 per Diesel
Power, kW	9
Voltage/phase/frequency V/ph/Hz	480/3/60
Source of Power/No. Heaters	MCC 3A312-S/1, MCC 3B312-S/1

TABLE 9.5-5 (Sheet 2 of 2) Revision 12-C (07/03)

Lube Oil Coolers

→(DRN 03-635, R12-C)

Quantity	Two coolers in series, per diesel	
Flow, gpm,	530	
Design Discharge Pressure, psig	Shell	Tube
→(DRN 00-691, R11-A) Flow, gpm ←(DRN 00-691, R11-A)	150	125
Design Temperature, F	200	200
Code	ASME Section III	

Lube Oil Strainer

Quantity	1 per Diesel
Design Pressure, psig	150
Flow, gpm	530
Design Temperature, F	250
Code	ASME Section III

Lube Oil Filter

Quantity	1 per Diesel
Design Pressure, psig	150
Flow, gpm	530
Design Temperature, F	200
Code	ASME Section III

Lube Oil Piping and Valves

Check	
Design Pressure, psig	150
Design Temperature, psig	200
Code	ASME Section III, Auxiliary Skid ANSI B31.1, Engine Skid Cooper Bessemer Supplied: Mfr. Standard

←(DRN 03-635, R12-C)

TABLE 9.5-6

SUMMARY OF ONSITE COMMUNICATION SYSTEM CAPABILITIES AND NOISE CONSIDERATION DURING TRANSIENTS AND/OR ACCIDENTS

STATIONS	MAXIMUM ANTICIPATED SOUND LEVELS dBA	COMMUNICATION SYSTEMS AVAILABLE AND MAXIMUM BACKGROUND NOISE FOR EFFECTIVE COMMUNICATION			
		PABX TELEPHONE (dBA) (h)	SOUND POWERED JACK STATIONS (dBA) (h)	PAGING SPEAKER (dBA) (h)	PORTABLE UHF RADIO (dBA) (h)
Main Control Room	70	80 (b)	80 (b)	75	80 (a)
Remote Shutdown Room	75	80 (b)	80 (b)	80	80 (a)
Emergency Feedwater Pump Rooms	95	100 (c)	100 (c)	100 (i)	100 (e)
Area Containing Emergency Feedwater Control Valves	85	100 (c)	100 (e)	90 (g)	100 (e)
Area Containing Atmospheric Steam Dump Valves	85	100 (c)	100 (e)	90 (g)	100 (e)
Safety Injection Pump Rooms	95	100 (c)	100 (e)	100 (i)	100 (e)
Shutdown Heat Exchanger Rooms	95	100 (c)	100 (e)	100 (g,i)	100 (e)
Charging Pump Rooms	95	100 (c)	100 (e)	100 (i)	100 (e)
Diesel Generator Rooms	105	125 (d)	130 (f)	100 (g,i)	120 (f)
CCW Pump Rooms	95	100 (b)	100 (e)	100 (g,i)	100 (e)

NOTES:

a) Subject to verification during start-up.

b) Standard type communication equipment.

c) Telephones equipped with noise cancelling microphones.

d) Soundproof booth or acoustic shield and noise cancelling microphones.

e) Boom microphone with ear-muff type headset.

f) Noise shielded microphone with ear-muff type headset.

g) Provided with additional power and closer spacing as appropriate.

h) After the plant is operational communication capability in light of actual background noise will be evaluated. Modifications will be made if necessary.

i) Provided with visual indication via an amber flashing beacon.