

4.0 FIRE HAZARDS ANALYSIS

4.1 Reactor Building

BUILDING FIRE AREA BOUNDARY CONSTRUCTION FEATURES

Building: REACTOR BUILDING

Elev.: 281' through 468'4-1/2"

Fire Area Name: REACTOR BUILDING

Length: 130 ft.

Width: 130 ft.

Height: 187 ft.

Area (Approx.): 13,273 ft² each elevation

Drawings: 1-FHA-017, 018, 019, 020, 021, 022, 023 and 024

Fire Area Boundaries:

Fire Area Boundary Barrier Ratings:

Fire Loading: ___ hours

Design Rating: 3 hours

The Fire Area Boundary Components Are As Follows:

Walls:

North - Reinforced Concrete

South - Reinforced Concrete

East - Reinforced Concrete

West - Reinforced Concrete

Ceiling:

Reinforced Concrete

Floor:

Reinforced Concrete

Doors:

Entrance is through double water tight doors, equipment or access hatches which do not have a UL labeled rating because of overriding nuclear considerations. However, their construction is considered adequate to contain fires, which could be postulated on either side of them.

Penetrations:

Containment penetrations through the Secondary Shield Wall do not have a specific fire rating due to overriding nuclear considerations, however, their construction is adequate to prevent the spread of fire from either side of the penetration. The reactor building houses the nuclear steam supply system. The steam generators, reactor coolant pumps, and pressurizer are located within a concrete secondary shielding, open at the top, and accessible at the lower elevation through a shielded labyrinth. The biological shield around the reactor vessel, and the refueling pool above it, divide the secondary shield into two parts. Each part contains one steam generator and two reactor coolant pumps. The east part of the secondary shield contains the pressurizer.

Inside the secondary shield at EL-281'-0" is a common area open to both A & B loops, OTSG's RCP's etc. A reactor coolant pump oil collection system is provided as described below:

License Amendment 44 for the fire protection program at Three Mile Island Unit 1 (TMI-1) included, in SER item 3.1.13 a requirement to demonstrate, "during a safe shutdown earthquake, the affect of the seismic event on the oil collection system will not adversely affect plant safety".

The drain piping was installed per our specification S.P. 5578 for small bore piping which adequately addresses the seismic requirements for supporting this size pipe inside the containment building. The oil collection tanks installed at the 281' elevation of the containment building were built to non-nuclear seismic I specifications and meet SME Section VIII and NFPA 30 requirements. The pump itself is mounted to seismic I requirements and the unit including motor and oil spray shields was purchased as an integral unit. The spray shields and the associated drip pans are lightweight and are not considered to constitute a missile hazard during a safe shutdown earthquake. These design criteria provide adequate assurance that during a safe shutdown earthquake the effects of the seismic event on the system will not adversely affect plant safety". The Fire Safety Evaluation Report, Supplement 4, dated September 19, 1980 included, "furthermore, as a result of our review of the license's proposed design of the reactor coolant pumps lubricating oil collection system we find that this proposed system meets the requirements of the modification titled, 'Reactor Coolant Pump Lubricating Oil Collection System'. We find this item of the program acceptable". Therefore, it is our determination that our oil collection system for the Reactor Coolant Pumps meet the requirements of 10CFR50 Appendix R. The 1989 Design for RCP Lube Oil System upgrade included relocation of sight glasses and installation of two remote fill stations. The sight glass relocation has been determined to be within the criteria of the previous acceptance regarding location and protection from damage. The two remote fill stations improve ALARA considerations and reduce physical handling of oil as a transient within the secondary shield wall. However, these fill stations and piping are not within the oil collection system nor are the drip pans under the fill stations piped to the oil collection tank. This departure from 10CFR50 Appendix R, Section III.0 is not considered to adversely affect the safe shutdown in the event of a fire and has been identified in an

Exemption Request.

The reactor building comprises a single fire area which has been divided into fire zones as described in the following sections.

The delineation of fire zones was not established considering the location of safety related components with respect to each other. For the purposes of this analysis, the Reactor Building, which is one fire area, was subdivided into fire zones taking into consideration the combustible loading in localized areas of the building. It is not possible to subdivide this building solely on the basis of physical boundaries combined with fixed fire suppression system prevalent in other fire zones in the plant as discussed in the justification for areas other than the Reactor Building. It should be noted that in identifying Appendix R Section III G non-compliances, the entire Reactor Building was considered one fire area. As a result, the legitigation of fire zones for the purposes of evaluating Appendix R non-compliances is not necessary. We prefer to leave the current delineation of fire zones as is since they do represent points of reference for localized combustible loadings in the building. To conclude, the Reactor Building was treated as one fire area for the purpose of evaluating Appendix R non-compliances. Non-compliances were not identified by evaluating each individual fire zone by itself. Note that modifications to eliminate Appendix R, Section III.G non-compliances will remain listed on a zone by zone basis and the Fire Hazards Analysis will continue using the current delineation of fire zones. We therefore maintain that the safety evaluation conducted for the Reactor Building, which identifies non-compliance with Section III.G of Appendix R to 10CFR50 considering the Reactor Building as one fire area is acceptable.

Technical Evaluation 396452-05 concludes that the plant can be taken to a safe hot shutdown condition and achieve and maintain cold shutdown with only one OTSG operable. The evaluation concludes that a fire in the D-ring containing the Pressurizer ('A' D-ring) would not prevent the plant from being safely shutdown.

4.1.1 Fire Zone, RB-FZ-1a

4.1.1.1 Fire Zone Boundary Construction Features

Building: REACTOR BUILDING Elev.: 281'

Fire Zone Name: REACTOR BUILDING OUTSIDE
SECONDARY SHIELD, NORTH

Length: 120 ft.

Width: 52 ft.

Height: 27 ft.

Area: 5,658 ft²

Drawings: 1-FHA-017 and 023

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are As Follows:

Walls:

North - Reinforced Concrete

South - Reinforced Concrete (Secondary Shield)

Remaining boundary is open to zones RB-FZ-1b and RB-FZ-1c

East - Reinforced Concrete

West - Reinforced Concrete

Ceiling:

Reinforced Concrete and Removable Steel Grating

Floor:

Reinforced Concrete

Columns:

Exposed Structural Steel

Beams:

Exposed Structural Steel

Doors:

Access to this zone is through an elevator, stairways and personnel and equipment hatches in other portions of the reactor building.

Barriers Within Zone:

Rockbestos Fire Zone R cable is utilized in this zone in lieu of Radiant Energy Heat Shield. See Attachment 3-1 for details.

Safe Shutdown Components:

For safe shutdown components located in this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.1.1.2 Analysis

The combustibles in this zone consist of cable insulation and lube oil. The fire loading is low. Fire protection for this zone consists of fire hose stations and ionization smoke detection as shown on drawing 1-FHA-017. A portable water extinguisher is located in zone RB-FZ-1c, which is adjacent to this zone. In addition portable fire extinguishers are located outside the personnel access hatch on elevation 308'-0" of the Turbine Building. Pumps FS-P5A/5B for the fire protection water spray for charcoal in the Kidney Filter Plenum system are located in this zone.

Exemptions:

Manual operation in lieu of cable protection. See Section 3.14 for details. Due to analysis as a single fire area, a fire in any zone may require manual action.

4.1.1.3 Conclusion

Due to the limited amount of combustible material in this zone and the features described, existing fire protection for this zone is considered adequate.

4.1.2 Fire Zone, RB-FZ-1b

4.1.2.1 Fire Zone Boundary Construction Features

Building: REACTOR BUILDING Elev.: 281'

Fire Zone Name: REACTOR BUILDING OUTSIDE SECONDARY SHIELD, SOUTHEAST

Length: 64 ft. Width: 9 ft.
Height: 27 ft.
Area: 674 ft²

Drawings: 1-FHA-017, 022

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are As Follows:

Walls:

North - Open to Zone RB-FZ-1a
South - Reinforced Concrete
East - Reinforced Concrete
West - Reinforced Concrete

Ceiling:

Reinforced Concrete and open stairway

Floor:

Reinforced Concrete

Columns:

Exposed Structural Steel

Beams:

Exposed Structural Steel

Doors:

Access to this zone is through stairways at elevation 281'-0", and personnel and equipment hatches at elevation 305'-0".

Barriers Within Zone:

Rockbestos Fire Zone R cable is utilized in this zone in lieu of Radiant Energy Heat Shields. Radiant Energy Heat Shields are also provided. See Attachment 3-1 for details.

Safe Shutdown Components:

For safe shutdown components located in this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.1.2.2 Analysis

The combustibles in this zone consist of concrete coating (paint). The fire loading is low. Fire protection for this zone consists of a fire hose station as shown on drawing 1-FHA-017. A portable water extinguisher is located in zone RB-FZ-1c. Other portable fire extinguishers are located outside the personnel access hatch on elevation 308;-0" of the Turbine Building.

Exemptions:

See Section 3.14 for details. Due to analysis as a single fire area, a fire in any zone may require manual action.

4.1.2.3 Conclusion

Due to the negligible amount of combustible material in the zone, and the features described existing fire protection for this zone is considered adequate.

4.1.3 Fire Zone, RB-FZ-1c

4.1.3.1 Fire Zone Boundary Construction Features

Building: REACTOR BUILDING Elev.: 281'

Fire Zone Name: REACTOR BUILDING OUTSIDE SECONDARY SHIELD, SOUTHWEST

Length: 104 ft.

Width: 10 ft.

Height: 27 ft.

Area: $2,095 \text{ ft}^2$

Drawings: 1-FHA-017, 022 and 023

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are As Follows:

Walls:

North - Reinforced Concrete (Secondary Shield Wall) remaining boundary is open to zone RB-FZ-1a

South - Reinforced Concrete

East - Reinforced Concrete

West - Reinforced Concrete

Ceiling:

Reinforced Concrete and open stairwell

Floor:

Reinforced Concrete

Columns:

Exposed Structural Steel

Beams:

Exposed Structural Steel

Doors:

Access to this zone is through stairways at elevation 281'-0" and personnel and equipment hatches at elevation 305'-0" in other portions of the reactor building

Barriers Within Zone:

Rockbestos Fire Zone R cable is utilized in this zone in lieu of Radiant Energy Heat Shields. Radiant Energy Heat Shields are also provided. See Attachment 3-1 for details.

Safe Shutdown Components:

For safe shutdown components located in this zone, See Attachment 3-6.

Safe Shutdown Repairs:

None

4.1.3.2 Analysis

The combustibles in this zone consist of cable insulation and concrete coating. The fire loading is low. Fire protection for this zone consists of a water fire extinguisher and a fire hose station as shown on drawing 1-FHA-017. Fire protection provided for DH-V-2 (Decay Heat Removal Valve) is by a manually actuated dry pipe fire suppression system with a single closed head nozzle. This specialized fire protection feature is not considered to require conformance to NFPA commitments. Ionization smoke detection is provided in this area as shown on drawing 1-FHA-017. Portable fire extinguishers are located outside the personnel access hatch on elevation 308'-0" of the Turbine Building.

Exemptions:

Manual operations in lieu of cable and valve protection; use of portable emergency lights. See Section 3.14 for details. Due to analysis as a single fire area, a fire in any zone may require manual action.

4.1.3.3 Conclusion

Due to the limited amount of combustible material in this zone, and the features described existing fire protection for this zone is considered adequate.

4.1.4 Fire Zone, RB-FZ-1d

4.1.4.1 Fire Zone Boundary Construction Features

Building: REACTOR BUILDING Elev.: 281'

Fire Zone Name: REACTOR BUILDING INSIDE SECONDARY SHIELD, EAST

Length: 48 ft.

Width: 27 ft.

Height: 84 ft.

Area: 1,592 ft²

Drawings: 1-FHA-017,018,019, 020, 021 and 022

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are As Follows:

Walls:

North - Reinforced Concrete

South - Reinforced Concrete

East - Reinforced Concrete

West - Reinforced Concrete, remainder open to zone RB-FZ-1e

Ceiling:

Open to zone RB-FZ-3

Floor:

Reinforced Concrete

Columns:

Exposed structural steel

Beams:

Exposed structural steel

Doors:

Access to this zone is through a nonrated shield door on the north boundary of this zone and by fixed ladders at the top of the zone.

Barriers Within Zone:

Rockbestos Fire Zone R cable is utilized in this zone in lieu of Radiant Energy Heat Shields. See Attachment 3-1 for details.

Safe Shutdown Components:

For safe shutdown components located in this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.1.4.2 Analysis

The combustibles in this zone consist of oil contained in the reactor coolant pump motor lubrication system and cable insulation. The fire loading is low. Each reactor coolant pump motor is equipped with an oil splash guard designed to collect the lubricating oil in case of a spill and an oil collection system for breakage of the oil piping or an oil reservoir rupture. The splash guard essentially encloses the upper bearing housing and is surrounded by a collection gutter. Three 2 inch lines are combined to drain, through a common 2-1/2 inch drain line, any accumulated oil to an oil collection tank. The tank, with flame arrestor meets the requirements of NFPA-30. The lower bearing is equipped with a collection pan, also connected to the 2-1/2 inch drain line. The auxiliaries required for reactor coolant pump motor lubrication are located in the upper bearing housing. The upper bearing oil reservoir has a capacity of 120 gallons and the lower bearing oil reservoir has a capacity of 18 gallons. A hose station located outside of this zone near the shield door on the north boundary of this zone is provided as fire suppression for this zone. An additional hose station is provided at the top of shield wall. Thermal fire detection is provided in this zone as shown on drawing 1-FHA-020. In addition, portable fire extinguishers are located outside the personnel access hatch on elevation 308'-0" of the Turbine Building.

Exemptions:

RCP Oil Collection System does not cover remote fill station or piping of remote fill. See Section 3.14 for details. Due to analysis as a single fire area, a fire in any zone may require manual actions.

4.1.4.3 Conclusion

Considering that the reactor coolant pump lube oil collection system collects spilled oil, this will appreciably reduce the probability that lubricating oil will be in contact with hot pipes, so the potential for a reactor coolant pump oil fire is very low. Due to this and the additional features described, existing fire protection for this zone is considered adequate.

4.1.5 Fire Zone, RB-FZ-1e

4.1.5.1 Fire Zone Boundary Construction Features

Building: REACTOR BUILDING Elev.: 281'

Fire Zone Name: REACTOR BUILDING INSIDE SECONDARY SHIELD, WEST

Length: 48 ft.

Width: 27 ft.

Height: 84 ft.

Area: 1,394 ft²

Drawings: 1-FHA-018, 019, 020, 021 and 022

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are As Follows:

Walls:

North - Reinforced Concrete

South - Reinforced Concrete

East - Reinforced Concrete, remainder open to zone RB-FZ-1d

West - Reinforced Concrete

Ceiling:

Open to zone RB-FZ-3

Floor:

Reinforced Concrete

Columns:

Exposed Structural Steel

Beams:

Exposed Structural Steel

Doors:

Access to this zone is by fixed ladders at the top of the zone and RB-FZ-1d.

Barriers Within Zone:

Rockbestos Fire Zone R cable is utilized in this zone in lieu of Radiant Energy Heat Shields. Radiant Energy Heat Shields are also provided. See Attachment 3-1 for details.

Safe Shutdown Components:

For safe shutdown component located in this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.1.5.2 Analysis

The combustibles in this zone consist of cable insulation and oil contained in the reactor coolant pump motor lubrication system. The fire loading is low. Each reactor coolant pump motor is equipped with an oil splash guard designed to collect the lubricating oil in case of a spill, and an oil collection system for breakage of the oil piping, or an oil reservoir rupture. The splash guard essentially encloses the upper bearing housing and is surrounded by a collection gutter.

RC-P-1D Motor:

Three 2 inch lines are combined, through a common 2-1/2 inch drain line, to drain any accumulated oil to an oil collection tank. The tank, with flame arrestor, meets the requirements of NFPA-30. The lower bearing is equipped with a collection pan, which is also connected to the 2-1/2 inch drain line. The auxiliaries required for reactor coolant pump motor lubrication are located in the upper bearing housing. The upper bearing oil reservoir has a capacity of 120 gallons and the lower bearing oil reservoir has a capacity of 18 gallons. A hose station located outside zone RB-FZ-1d

near the shield door on the north boundary of that zone will serve as fire suppression for this zone. An additional hose station is provided at the top of the shield wall.

RC-P-1C-Motor:

The upper bearing drains to an oil collection tank through a 2 inch drain line. The lower bearing drains to an oil collection drain tank through a 2 inch drain line that is connected to the upper bearing drain line. The tank, with flame arrestor, meets the requirements of NFPA-30. The upper bearing oil reservoir has a capacity of 187 gallons and the lower bearing oil reservoir has a capacity of 29 gallons. A hose station located outside zone RB-FZ-1d near the shield door on the north boundary of that zone will serve as fire suppression for this zone. An additional hose station is provided at the top of the shield wall.

Thermal fire detection is provided in this fire zone and shown on drawing 1-FHA-020.

DH-V-1 is provided with a manually actuated fire suppression system with a single closed head nozzle supplied from the hose reel stand pipe as shown on 1-FHA-017. This specialized fire protection feature is not considered to require conformance to NFPA commitments. In addition, portable fire extinguishers are located outside the personnel access hatch on elevation 308'-0" of the Turbine Building.

Exemption:

RCP Oil Collection System does not cover remote fill station or piping of remote fill. See Section 3.14 for details. Due to analysis as a single fire area, a fire in any zone may require manual action.

4.1.5.3 Conclusion

Considering that the reactor coolant pump lube oil collection system collects spilled oil, this will appreciably reduce the probability that lubricating oil will be in contact with hot pipes, so the potential for a reactor coolant pump oil fire is very low. Due to this and the additional features described, existing fire protection for this zone is considered adequate.

4.1.6 Fire Zone, RB-FZ-2

4.1.6.1 Fire Zone Boundary Construction Features

Building: REACTOR BUILDING Elev.: 308'

Fire Zone Name: REACTOR BUILDING OUTSIDE SECONDARY SHIELD

Length: 130 ft.

Width: 52 ft.

Height: 38 ft.

Area: 7,777 ft²

Drawings: 1-FHA-018

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are As Follows:

Walls:

North - Reinforced Concrete

South - Reinforced Concrete

East - Reinforced Concrete

West - Reinforced Concrete

Ceiling:

Reinforced Concrete, removable steel grating and open stairwell.

Floor:

Reinforced Concrete, removable steel grating and open stairwell.

Columns:

Exposed Structural Steel

Beams:

Exposed Structural Steel

Doors:

Access to this zone is through the personnel and equipment hatches of the reactor building.

Barriers Within Zone:

Rockbestos Fire Zone R cable is utilized in this zone in lieu of Radiant Energy Heat Shields. Radiant Energy Heat Shields are also provided. See Attachment 3-1 for details.

Safe Shutdown Components:

For safe shutdown components located in this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.1.6.2 Analysis

The combustibles in this zone consist of charcoal in the kidney filter plenum, cable insulation, transient materials and concrete coating. The fire loading is low. Fire protection for this zone consists of partial ionization type smoke detection, two fire hose stations and water type portable fire extinguishers. An independent, self-contained deluge system is provided for the charcoal in the kidney filter plenum. This system is automatically actuated by thermal detectors and supplied by two 90 gpm electric pumps. The actuation equipment is provided with emergency power to provide an alarm capability during loss of normal power supply. Additional Portable fire extinguishers are located outside the personnel access hatch on elevation 308'-0" of the Turbine Building.

Exemptions:

Manual operation in lieu of cable protection; use of portable emergency lights (manual action is in RB-FZ-1c, however access is through RB-FZ-2). See Section 3.14 for details. Due to analysis as a single fire area, a fire in any zone may require manual action.

4.1.6.3 Conclusion

Due to the limited amount of combustible material in this zone, and the features described, existing fire protection for this zone is considered adequate.

4.1.7 Fire Zone, RB-FZ-3

4.1.7.1 Fire Zone Boundary Construction Features

Building: REACTOR BUILDING Elev.: 346'

Fire Zone Name: REACTOR BUILDING IN AND OUTSIDE SECONDARY SHIELD
OPERATING FLOOR, POOL, AND INSIDE RV PRIMARY SHIELD

Height: 187 ft.

Area: 10,082 ft²

Drawings: 1-FHA-020

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are As Follows:

Walls:

North - Reinforced Concrete

South - Reinforced Concrete

East - Reinforced Concrete

West - Reinforced Concrete

Ceiling:

Reinforced Concrete

Floor:

Reinforced Concrete, removable steel grating and open stairwells.

Columns:

Exposed Structural Steel

Beams:

Exposed Structural Steel

Doors:

Access to this zone is through personnel and equipment hatches in other portions the reactor building.

Barriers Within Zone:

Rockbestos Fire Zone R cable is utilized in this zone in lieu of Radiant Energy Heat Shields. Radiant Energy Heat Shields are also provided. See Attachment 3-1 for details.

Safe Shutdown Components:

For safe shutdown components located in this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.1.7.2 Analysis

The combustibles in this zone consist of cable insulation and transient materials. The fire loading is low. Note that NI instrumentation is located in the reactor vessel cavity at floor elev. 281'-0". There are also two remote fill stations for the RCP Lube Oil Reservoirs in this fire zone. Drip pans provided are not piped to the RCP Lube Oil Collection System. Combustible loading in this area of the zone is approximately zero. The fire protection for this zone consists of fire hose stations, ionization smoke detectors, and a portable fire extinguisher as shown on drawings 1-FHA-020 and 1-FHA-021. Portable fire extinguishers are located outside the personnel access hatch on elevation 308'-0" of the Turbine Building.

The cables for the reactivity measurement instruments, CG341B for NI-11 and CG441B for NI-12, are routed only in embedded conduit in this fire zone. The embedded conduit is located below 10.5 inches of concrete. The concrete can be shown to be an equivalent radiant energy heat shield that satisfies the criteria of Section III.G.2 of Appendix R to 10 CFR Part 50. NRC Generic Letter 86-10 states that any material with a ½ hour fire rating should be a capable heat shield. Figure 19.2.7 of the 20th edition of the National Fire Protection Association Fire Protection Handbook shows the fire ratings for concrete floors of varying thickness and aggregate. The most conservative aggregate shows that a 1 hour rating can be achieved with a thickness slightly less than 3 inches; therefore, the 10.5 inch concrete embedded conduits are more than an adequate ½ hour fire barrier and can be classified as a radiant heat shield which protects cables CG341B and CG441B.

Exemptions:

Drip pans for RCP Lube Oil Reservoirs Remote Fill Stations not piped to RCP Lube Oil Collection system. Manual operation in lieu of cable protection. See Section 3.14 for details. Due to analysis as a single fire area, a fire in any zone may require manual action.

4.1.7.3 Conclusion

Due to the limited amount of combustible material in this zone, and the features described, existing fire protection for this zone is considered adequate.

Auxiliary BuildingBUILDING FIRE AREA BOUNDARY CONSTRUCTION FEATURES

Building: AUXILIARY BUILDING Elev.: 261' through 331'-0"

Length: 160 ft.

Width: 116 ft.

Height: 28 ft.

Area (Approx.): 18,500 ft²

Drawings: 1-FHA-025, 026, 027, 030, 031, 032

Fire Area Boundaries:

Fire Area Boundary Barrier Ratings:

Fire Loading: ____ hours

Design Rating: 3 hours

The Fire Area Boundary Components Are As Follows:

Walls:

North - Reinforced Concrete-unrated except where the building adjoins the Reactor Building

South - Reinforced Concrete-unrated except where the building adjoins the Air Intake Tunnel

East - Reinforced Concrete-unrated

West - Reinforced Concrete-unrated

Ceiling:

Reinforced Concrete-rated in the chemical addition area and ESF ventilation room

Floor:

Reinforced Concrete-unrated

Doors:

Access to this building is described under the construction features for each fire area and zone.

The auxiliary building houses auxiliary equipment for the nuclear reactor. This equipment includes waste handling and safe shutdown equipment.

4.2.1 Fire Area AB-FA-1

4.2.1.1 Fire Area Boundary Construction Features

Building: AUXILIARY BUILDING Elev.: 261'

Fire Area Name: Decay Heat Removal Pit A and "A" BS vault

Length: 44 ft.

Width: 23 ft.

Height: 20 ft.

Area: 870 ft²

Drawings: 1-FHA-025

Fire Area Boundaries:

Fire Area Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: 3 hours

The Fire Area Boundary Components Are As Follows:

Walls:

North - Reinforced Concrete-non fire rated*

South - Reinforced Concrete - Rated

East - Reinforced Concrete - Rated

West - Reinforced Concrete-non fire rated*

Ceiling:

Reinforced Concrete - Rated (except equipment hatches and reach rod penetrations)

The DH/BS Vault Shield Plugs are installed using fire barrier installation procedure 1420-FB-1 to supply caulk sealant requirements between the plugs and the floor. This procedure defines the use of the same RTV caulk material that is used in rated fire seals. Due to the small openings between the joints, the normal 9" seal depth for a straight through unobstructed fire penetration is not possible. Therefore, the RTV caulk is used only to seal the gap between plugs and the floor while the concrete on concrete plug configuration provides the balance of the barrier.

These fire barrier seals are not credited as rated fire barrier seals as there is not a documented fire test formally documenting this equipment plug configuration consists of a staggered concrete vertical joint in the two-foot thick concrete equipment access plugs. The step change in the plugs occurs one foot from the top and bottom surfaces of the plugs. This step change not only provides a means to support the adjacent plugs but also prevents radiation streaming and prevents a clear path for fire or smoke from either side of the plugs. The addition of RTV caulking to the opening around the plugs prevents any smoke passage to and from the vaults through any

small gaps as well as provides a water barrier. In addition, the RTV prevents potential debris and unwanted material from being collected between concrete plugs and the floor as well as provides personnel safety by preventing a potential trip hazard. This construction design is adequate to contain a postulated fire.

Floor:

Reinforced Concrete-non fire rated*

*No adjacent fire area or zone.

Doors:

Access to this area is through steel personnel access hatches. The ceiling slab is covered with sealed steel equipment access hatch covers to the "A" DH and BS pits which are unrated. The covers are 1/4" thick steel with 1-1/2" overlap on edges of openings, which are maintained normally closed and monitored daily.

Penetrations:

The ceiling is penetrated by air handling supply and return ducts, cable trays and piping. All penetrations through the ceiling (with the exception of three 3/4 inch unsealed reach rod penetrations and the access hatch), south wall, and east wall are sealed with three hour rated fire seals. The reach rod penetrations are tight fitting and equipped with steel collars covering the openings. All duct penetrations through the rated walls are provided with three hour rated fire dampers with 165°F fusible links. Containment penetrations do not have a specific fire rating due to overriding nuclear considerations, however, their construction is adequate to prevent the spread of fire to the Reactor Building.

Barrier Within Area:

None

Safe Shutdown Components:

For safe shutdown components located in this area, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.2.1.2 Analysis

The combustibles in this area consist of pump lube oil and cable insulation. The fire loading is low.

The fire protection for this area consists of area wide smoke detection, which

actuates alarms in the control room. Hose protection is available in zone AB-FZ-4 on the floor above as shown on drawing 1-FHA-026. The rated ceiling, which contains the unsealed reach rod penetrations and unrated equipment hatches, is adjacent to fire zones AB-FZ-4 and AB-FZ-5. AB-FZ-4 is provided with an automatic pre-action sprinkler system. AB-FZ-5 has a low combustible loading and a fire detection system over the hatch location.

Exemptions: Manual operation of valves in lieu of protection of instrument air supply. See Section 3.14 for details.

4.2.1.3 Conclusions

The results of the analysis indicate the boundaries of the fire area, including the unsealed reach rod penetrations and steel hatch covers, are adequate to contain a postulated fire. Due to the features described, existing fire protection for this area is considered adequate.

4.2.2 Fire Zone, AB-FZ-2

4.2.2.1 Fire Zone Boundary Construction Features

Building: AUXILIARY BUILDING Elev.: 261'

Fire Area Name: Decay Heat Removal Pit B and "B" BS vault

Length: 60 ft. Width: 22 ft.

Height: 20 ft.

Area: 1,258 ft²

Drawings: 1-FHA-025

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: 3 hours

The Fire Zone Boundary Components Are Evaluated As Follows:

Zone boundaries consist of reinforced concrete walls, floor and ceiling. The south wall is not adjacent to any other plant area except where adjacent to the Auxiliary Building Sump Room. Combustible loadings on either side of this non-fire rated zone boundary between AB-FZ-2 and AB-FZ-5 are listed in the analysis for each zone. The north wall is a three hour rated barrier. The west wall is not adjacent to any other plant area. The east wall is not adjacent to any other plant area except where it adjoins the Reactor Building where it is a three hour rated barrier. The ceiling is a three hour rated barrier except for equipment hatches and reach rod penetrations as described below. The DH/BS Vault Shield Plugs are installed using fire barrier

installation procedure 1420-FB-1 to supply caulk sealant requirements between the plugs and the floor. This procedure defines the use of the same RTV caulk material that is used in rated fire seals. Due to the small openings between the joints, the normal 9" seal depth for a straight through unobstructed fire penetration is not possible. Therefore, the RTV caulk is used only to seal the gap between plugs and the floor while the concrete on concrete plug configuration provides the balance of the barrier.

These fire barrier seals are not credited as rated fire barrier seals as there is not a documented fire test formally documenting this equipment plug configuration. The robust concrete plug configuration consists of a staggered concrete vertical joint in the two-foot thick concrete equipment access plugs. The step change in the plugs occurs one foot from the top and bottom surfaces of the plugs. This step change not only provides a means to support the adjacent plugs but also prevents radiation streaming and prevents a clear path for fire or smoke from either side of the plugs. The addition of RTV caulking to the opening around the plugs prevents any smoke passage to and from the vaults through any small gaps as well as provides a water barrier. In addition, the RTV prevents potential debris and unwanted material from being collected between concrete plugs and the floor as well as provides personnel safety by preventing a potential trip hazard. The construction design is adequate to contain a postulated fire. The floor is not adjacent to any other plant area.

The reinforced concrete wall between this zone and the Auxiliary Building Sump Room provides a formidable barrier to fire propagation even though the wall is not fully rated. The unsealed penetrations are small. The ceiling above the pump room provides additional separation between the majority for fire zone AB-FZ-5 on elevation 281'-0" and this boundary. Therefore, there is no concern regarding horizontal and vertical separation in that the chances of a fire originating on the floor above the Sump Room spreading into the Sump Room and across the zone boundary is remote. The same can be considered from a fire originating in Fire Zone AB-FZ-2. Combustible loading in both Fire Zones and particularly in the vicinity of the Sump Room and the Sump Room itself is low. The nature of the combustibles as well as the presence of area smoke detection on both sides of the boundary combined with the availability of a manual hose station on the floor above provides assurance that the plant's ability to safely shutdown is not in jeopardy.

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis criteria. The classification of each boundary in the zone is presented below:

| <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|-------------|-------------|--------------|----------------|
| <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| Rated | A1/B3 | A1/Rated | A1 | A1 | Rated* |

*See above sections.

Doors:

Access to this area is through steel personnel access hatches. The ceiling slab is covered with sealed steel equipment access hatch covers to the "B" DH and BS pits which are unrated. The covers are 1/4" thick steel with 1-1/2" overlap on edges of openings, which are maintained normally closed and monitored daily.

Penetrations:

The ceiling is penetrated by air handling supply and return ducts, cable trays and piping. All penetrations through the ceiling (except for three 3/4 inch unsealed reach rod penetrations and the steel access hatches), north wall and rated portions of south and east walls of this fire area are sealed with three hour rated fire seals. The reach rod penetrations are tight fitting and equipped with steel collars covering the openings. The DH/BS Vault Shield Plugs are installed using fire barrier installation procedure 1420-FB-1 to supply caulk sealant requirements between the plugs and the floor. This procedure defines the use of the same RTV caulk material that is used in rated fire seals. Due to the small openings between the joints, the normal 9" seal depth for a straight through unobstructed fire penetration is not possible. Therefore, the RTV caulk is used only to seal the gap between plugs and the floor while the concrete on concrete plug configuration provides the balance of the barrier.

These fire barrier seals are not credited as rated fire barrier seals as there is not a documented fire test formally documenting this equipment plug configuration. The robust concrete plug configuration consists of a staggered concrete vertical joint in the two-foot thick concrete equipment access plugs. The step change in the plugs occurs one foot from the top and bottom surfaces of the plugs. This step change not only provides a means to support the adjacent plugs but also prevents radiation streaming and prevents a clear path for fire or smoke from either side of the plugs.

The addition of RTV caulking to the opening around the plugs prevents any smoke passage to and from the vaults through any small gaps as well as provides a water barrier. In addition, the RTV prevents potential debris and unwanted material from being collected between concrete plugs and the floor as well as provides personnel safety by preventing a potential trip hazard. The construction design is adequate to contain a postulated fire. All duct penetrations through the rated walls are provided with three hour rated fire dampers equipped with 165°F fusible links. Containment penetrations do not have a specific fire rating due to overriding nuclear considerations, however, their construction is adequate to prevent the spread of fire to the Reactor Building.

Barriers Within Area:

None

Safe Shutdown Components:

For safe shutdown components located in this area, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.2.2.2 Analysis

The combustibles in this area consist of pump lube oil contained in sumps and cable insulation. The fire loading is low. The fire protection for this area consists of area wide smoke detection, which actuates alarms in the control room. Hose protection is available in zone AB-FZ-4 on the floor above as shown on drawing 1-FHA-026. The rated ceiling, which contains the unsealed reach rod penetrations and unrated equipment hatches, is adjacent to fire zones AB-FZ-4 and AB-FZ-5. AB-FZ-4 is provided with an automatic pre-action sprinkler system. AB-FZ-5 has a low combustible loading and a fire detection system over the hatch location.

Exemptions:

Manual operation of valves in lieu of protection of instrument air supply. See Section 3.14 for details.

4.2.2.3 Conclusion

The results of the analysis indicate the boundaries of the fire area, including the unsealed reach rod penetrations and steel hatch covers, are adequate to contain a postulated fire. Due to the features described, fire protection for this area is considered adequate.

4.2.3 Remainder of Auxiliary Building

4.2.3.1 Fire Zone AB-FZ-1

4.2.3.1.1 Fire Zone Boundary Construction Features

Building: AUXILIARY BUILDING Elev.: 271'

Fire Zone Name: Heat Exchanger Vault

Length: 116 ft.

Width: 60 ft.

Height: 34 ft.

Area: 6,900 ft²

Drawings: 1-FHA-025, 030, 031, 032

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are Evaluated As Follows:

Zone boundaries consist of reinforced concrete walls, floor and ceiling. The south and west walls and the floor are not adjacent to any other plant areas. The upper portion of the east wall is adjacent to fire zone AB-FZ-5. The remainder is not adjacent to any other plant area. A portion of the north wall is adjacent to fire zone AB-FZ-5 via a stairwell. The ceiling is a three hour rated barrier. Combustible loadings on either side of the non-fire rated zone boundary between AB-FZ-1 and AB-FZ-5 are listed in the analysis for each of these zones.

The principal combustible in this zone is cable insulation. Should ignition of cable occur either electrically or due to transient combustibles, exposed cable in tray penetrations is sealed with kaowool to preclude a slow burning cable fire from propagating through the zone boundary although the seal is not required or fire rated. The HVAC penetration does not require a fire damper. This zone boundary is not relied on to protect redundant trains of safe shutdown equipment on either side of the boundary.

The reinforced concrete walls in this zone provide a formidable barrier to fire propagation even though the walls are not fully rated. The fire load within this zone is negligible; therefore, should a fire occur it would be of insufficient duration and intensity to propagate across the zone boundaries to adjacent zones even though a limited number of unsealed penetrations exist. Furthermore, since there is no redundant safe shutdown equipment in adjacent zones, the plant's ability to safely shutdown is not in jeopardy.

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis criteria. The classification of each boundary in this zone is presented below:

| <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|-------------|-------------|--------------|----------------|
| <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| B2 | A1 | B2 | A1 | A1 | Rated |

Doors:

Access points to this zone are through the north wall which is non-fire rated.

Barriers Within Zone:

None

Safe Shutdown Components:

For safe shutdown components located in this area, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.2.3.1.2 Analysis

The combustibles in this zone consist of cable insulation and transient material. The fire loading is low. Fire protection in the zone consists of partial smoke detection over cable trays that alarms in the control room, a portable fire extinguisher and a fire hose station as shown on drawing 1-FHA-025.

Exemptions:

None

4.2.3.1.3 Conclusions

Due to the limited amount of combustible material in the zone and the features described, existing fire protection for this zone is considered adequate.

4.2.3.2 Fire Zones AB-FZ-2a, AB-FZ-2b, & AB-FZ-2c

4.2.3.2.1 Fire Zone Boundary Construction Features

Building: AUXILIARY BUILDING Elev.: 281'

Fire Zone Name: Makeup and Purification Pumps A (AB-FZ-2a),
B (AB-FZ-2b) and C (AB-FZ-2c)

Length: 22 ft./cubicle Width: 12 ft./cubicle
Height: 24 ft.
Area (Approx.): 264 ft²/cubicle

Drawings: 1-FHA-026, 030, 032

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours/cubicle

Design Rating: - hours on all sides

The Fire Zone Boundary Components Are Evaluated As Follows:

Three-hour rated fire barriers are provided on the north wall of AB-FZ-2a, the wall separating AB-FZ-2a and AB-FZ-2b, and the south wall of AB-FZ-2c. The east wall of each of these zones is three hour rated and each contains reach rod penetrations consisting of 2-1/2 inch core bores with 2-inch diameter rods equipped with steel

collars covering the openings in the walls. The duct penetrating east wall of AB-FZ-2c is provided with a 3-hour fire damper. All other penetrations in these walls are controlled and maintained with three hour rated fire seals except for two duct penetrations in the south wall of AB-FZ-2c, which are sealed but not provided with fire dampers in the ducts.

The wall separating AB-FZ-2b and AB-FZ-2c does not separate redundant equipment required for safe shutdown and is considered a B-2 boundary. The west boundary of each of these zones consists of reinforced concrete around a door section containing a 1-1/2 hour fire rated, class B fire door with a fusible link actuated 1-1/2 hour rated damper protecting the ventilation grill in each door, with the remainder of the west boundary of each zone constructed of solid concrete block, sealed to a 3 hour fire rating. The floor of each zone is not adjacent to any other fire area. The ceiling of each zone is a three hour rated barrier. The reach rod area and penetrations are relatively small, with a configuration that significantly retards the passage of flame, smoke and hot gases.

The class B fire doors provide an adequate barrier against the passage of flame, smoke and hot gases between these fire zones and adjacent fire zone AB-FZ-5.

The two duct penetrations in the south wall of AB-FZ-2c without fire dampers significantly retards the passage of flame, smoke and hot gases due in part to the penetration seal provided in the wall, which is common with AB-FZ-5.

Combustible loadings on either side of the non-fire rated zone boundary are identified in the analysis for each of the following zones:

AB-FZ-2a, AB-FZ-2b, AB-FZ-2c and AB-FZ-5

Even though the fire loading in AB-FZ-2a exceeds 40,000 BTU/sq.ft., the existing configuration is adequate to prevent fire propagation to an adjacent zone.

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis criteria. The classification of each boundary in these zones is presented below:

| | <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|----------|--------------|--------------|-------------|-------------|--------------|----------------|
| | <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| AB-FZ-2a | Rated | Rated | Rated* | B1 | A1 | Rated |
| AB-FZ-2b | Rated | B2 | Rated* | B1 | A1 | Rated |
| AB-FZ-2c | B2 | Rated** | Rated* | B1 | A1 | Rated |

* Rated except for reach rod penetrations

** Rated except two ducts have no fire damper.

Doors:

Entrances to each zone is through the west wall of each zone through 1-1/2 hour rated Class B fire doors.

Barriers Within Zone:

None

Safe Shutdown Components:

For safe shutdown components located in this area, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.2.3.2.2 Analysis

The combustibles in each cubicle consist of pump lube oil contained in sumps, transients, concrete coating (paint) and cable. The fire loading is low. Fire protection for the cubicles consists of smoke detection, which actuates alarms in the control room. Hose protection is provided outside each fire zone in fire zones AB-FZ-4 and AB-FZ-5 as well as a portable fire extinguisher in zone AB-FZ-5 as shown on drawing 1-FHA-026.

Exemptions:

Manual operation in lieu of cable and valve protection. See Section 3.14 for details.

4.2.3.2.3 Conclusion

Due to the limited amount of combustibles in each zone, and the features described, existing fire protection for these zones is considered adequate.

4.2.3.3 Fire Zone AB-FZ-3

4.2.3.3.1 Fire Zone Boundary Construction Features

Building: AUXILIARY BUILDING

Elev.: 281' and 295'

Fire Zone Name: Valve Gallery

Length: 40 ft.

Width: 7 ft.

Height: 23 ft.

Area: 300 ft²

Drawings: 1-FHA-026

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are Evaluated As Follows:

A three-hour rated fire barrier is provided on the west wall. Six penetrations for reach rods for valve operators through the west wall are not fully sealed. Each reach rod penetration consists of a 2-1/2 inch core bore with a 2-inch diameter rod equipped with a steel collar covering the opening in the wall. The duct penetration in this wall adjacent to zone AB-FZ-2c is provided with a 3 hour rated fire damper. All other penetrations in this wall are controlled and maintained with three-hour rated fire seals.

The floor is not adjacent to any other plant area. The south wall is constructed of reinforced concrete and is adjacent to fire zone AB-FZ-5. Penetrations in this wall (between AB-FZ-3 and AB-FZ-5) need not be sealed due to the B3 classification.

AB-FZ-3 is separated from the portion of AB-FZ-5 containing required cables by the make-up tank room and the WDL-P-10 and 11 slurry pump room. Although both of these rooms are part of AB-FZ-5, each is enclosed by reinforced concrete enclosures with labyrinthine entries. Both rooms contain negligible combustibles. These two rooms create a buffer of approximately 33 ft. with no continuity of combustibles to support conflagrations between AB-FZ-3 and the portion of AB-FZ-5 containing the required cables as well as two reinforced concrete walls with labyrinthine entries to further impede the spread of fire. The existing separation distance, physical characteristics and combustible loading, when considered in tandem create an adequate physical horizontal separation. The east wall is constructed of reinforced concrete and is adjacent to fire zone FH-FZ-1, which is provided with an automatic wet pipe sprinkler system. The ceiling is constructed of reinforced concrete and is

adjacent to fire zone AB-FZ-6. The ceiling of this zone is a B1 classification with all but four open pipe penetrations (between AB-FZ-3 and AB-FZ-6) sealed with a non-combustible material having at least a one hour fire rating. The four open pipe penetrations are located in the floor of AB-FZ-6 near the east barrier at the deborating demineralizer. This location is bounded on three sides by reinforced concrete walls and is open to the remainder of AB-FZ-6, about 20 ft. to the west, where required components are located. The deborating demineralizer location contains negligible combustibles, and provides a buffer with no continuity of combustibles to prevent conflagration between AB-FZ-3 and AB-FZ-6. Since AB-FZ-3 contains a very low combustible loading as well as smoke detectors, early response by plant fire brigade is expected to limit the extent of a fire. While smoke and hot gases may pass through the four open penetrations into AB-FZ-6, there is little to ignite in the immediate vicinity. The smoke and hot gases passing upward through the four open penetrations will be subject to considerable air mixture dilution and is not expected to reach high temperatures in the portions of AB-FZ-6 containing required components for the relatively short periods of expected fire duration in AB-FZ-3. Should a fire occur in AB-FZ-6, it is not considered credible that smoke and hot gases would accumulate in the deborating demineralizer area of AB-FZ-6 in such concentration as to permeate downward through the four open penetrations into AB-FZ-3 and cause temperatures to reach a level capable of igniting cable or components in AB-FZ-3. The north boundary is adjacent to fire zone AB-FZ-4; there is no construction separating the zones, however, fire zone AB-FZ-4 is protected by an automatic pre-action system and a fire detection system, which alarms in the control room. Combustible loadings on either side of each non-fire rated zone boundary are identified in the analysis for each of the following fire zones:

AB-FZ-3, AB-FZ-5, FH-FZ-1, AB-FZ-6, and AB-FZ-4

The principal combustible in this zone is cable insulation. Should ignition of cable occur either electrically or due to transient combustibles, the boundary features preclude a slow burning cable fire from propagating through the zone boundary.

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis criteria. The classification of each boundary in this zone is presented below:

| <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|-------------|-------------|--------------|----------------|
| <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| A2 | B3 | A2 | *Rated | A1 | **B1 |

* Rated except for reach rod penetrations.

** Rated except for four pipe penetrations up to deborating demineralizer room.

Doors:

Entrance to this zone is through the north boundary, which is open to fire zone AB-FZ-4.

Barriers Within Zone:

One hour fire rated barriers are provided for circuits. See Attachment 3-1 for details.

Safe Shutdown Components:

For safe shutdown components located within this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.2.3.3.2 Analysis

The main combustible in this zone is cable insulation. The fire loading is low. Fire protection for this zone consists of zone coverage smoke detection on both elevation 281'-0" and 295'-0" which actuate alarms in the control room. Hose protection is provided outside this fire zone in zone AB-FZ-4 as shown on drawing 1-FHA-026.

Exemptions:

Manual operation in lieu of cable and valve protection; lack of automatic fire suppression; manual operation of valves in lieu of protection of instrument air supply. See Section 3.14 for details.

4.2.3.3.3 Conclusions

Due to the limited amount of combustible material in this zone, and the features described, existing fire protection for this zone is considered adequate.

4.2.3.4 Fire Zone AB-FZ-4

4.2.3.4.1 Building: AUXILIARY BUILDING Elev.: 281'

Fire Zone Name: Penetration Area

Length: 45 ft.

Width: 30 ft.

Height: 23 ft.

Area: 1,008 ft²

Drawings: 1-FHA-026

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are Evaluated As Follows:

A three-hour rated fire barrier is provided on the south boundary where adjacent to AB-FZ-2a and on the north boundary, which is adjacent to the Reactor Building. Containment penetrations do not have a specific fire rating due to overriding nuclear considerations, however, their construction is adequate to prevent the spread of fire to the Reactor Building. A portion of the south boundary adjacent to zone AB-FZ-3, the east boundary adjacent to zone FH-FZ-1, and the west boundary adjacent to zone AB-FZ-5 is not separated by wall construction. Zone AB-FZ-4 is protected by a fire detection system, which alarms in the control room and an automatically actuated pre-action system. In addition, zone FH-FZ-1 is protected by an automatic wet pipe sprinkler system as well as a fire detection system, which alarms in the control room, which compensates for a combustible load greater than 40,000 BTU/sq. ft. The floor of this zone over fire areas AB-FA-1, AB-FZ-2 and fire zone IB-FZ-8 as well as the wall common to IB-FZ-8 is a three-hour rated fire barrier with the exception of six unsealed 3/4 inch reach rod penetrations, concrete Decay Heat/Building Spray Vault Shield Plugs two 1/4-inch thick steel equipment hatches which are unrated over fire area AB-FZ-2 and a steel door; however, all other penetrations where adjacent to fire areas AB-FA-1, AB-FZ-2 and IB-FZ-8 are controlled and maintained with three-hour rated fire seals. The hatches are monitored daily to assure that they are kept closed.

The reach rod penetrations are tight fitting and equipped with steel collars covering the openings. The DH/BS Vault Shield Plugs are installed using fire barrier installation procedure 1420-FB-1 to supply caulk sealant requirements between the plugs and the floor. This procedure defines the use of the same RTV caulk material that is used in rated fire seals. Due to the small openings between the joints, the normal 9" seal depth for a straight through unobstructed fire penetration is not possible. Therefore, the RTV caulk is used only to seal the gap between plugs and the floor while the concrete on concrete plug configuration provides the balance of the barrier.

These fire barrier seals are not credited as rated fire barrier seals as there is not a documented fire test formally documenting this equipment plug configuration. The robust concrete plug configuration consists of a staggered concrete vertical joint in the two-foot thick concrete equipment access plugs. The step change in the plugs occurs one foot from the top and bottom surfaces of the plugs. This step change not only provides a means to support the adjacent plugs but also prevents radiation streaming and prevents a clear path for fire or smoke from either side of the plugs.

The addition of RTV caulking to the opening around the plugs prevents any smoke passage to and from the vaults through any small gaps as well as provides a water barrier. In addition, the RTV prevents potential debris and unwanted material from being collected between concrete plugs and the floor as well as provides personnel safety by preventing a potential trip hazard. The construction design is adequate to

contain a postulated fire. The remainder of the floor is not adjacent to any other plant area. The ceiling consists of reinforced concrete with an open stairwell adjacent to zone AB-FZ-6; the remainder of the ceiling consists of reinforced concrete adjacent to zone AB-FZ-7. Combustible loadings on either side of each non-fire rated zone boundary are identified in the analysis for each of the following fire zones:

AB-FZ-4, AB-FZ-3, FH-FZ-1, AB-FZ-6, AB-FZ-7 and AB-FZ-5

The principal combustible in this zone is cable insulation. Should ignition of cable occur either electrically or due to transient combustibles, the boundary features prevent fire from propagating through the zone boundary.

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis criteria. The classification of each boundary in this zone is presented below:

| <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|-------------|-------------|--------------|----------------|
| <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| Rated | Rated/A2 | A2 | A2 | A1/Rated* | A2 |

* Except for steel hatches, Vault Plugs, and unsealed reach rod penetrations.

Doors:

Entrance to this zone is through the east boundary, which is open to zone FH-FZ-1 and the west boundary, which is open to zone AB-FZ-5.

Barriers Within Zone:

Fire rated barriers are provided for circuits ranging from a rating of 39 minutes (min. required) to one hour. Rockbestos Fire Zone R cable is installed. Terminations at Reactor Building penetration assemblies are provided with one hour fire rated protection. See Attachment 3-1 for details.

Safe Shutdown Components:

For safe shutdown components located in this area, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.2.3.4.2 Analysis

The combustibles in this zone consist of cable insulation and transient material. The fire loading is low. Fire protection for this zone consists of an automatic pre-action sprinkler system and a hose station. Smoke detection is provided, which actuates alarms in the Control Room.

Additional hose protection is provided in zone AB-FZ-5 and portable fire extinguishers are provided in zones AB-FZ-5 and FH-FZ-1 as shown on drawing 1-FHA-026.

Exemptions:

Manual operation in lieu of valve, valve operator and cable protection; Rockbestos Fire Zone R cable in lieu of one hour rated barriers; minimum 39 minute fire barrier rating for cable raceway fire barrier in lieu of one hour rating; no fire barriers on tray and conduit supports; non-rated steel door in fire barrier; 20 ft. separation with intervening combustibles. See Section 3.14 for details.

4.2.3.4.3 Conclusion

Due to the limited combustibles, and the features described, existing fire protection for this zone is considered adequate.

4.2.3.5 Fire Zone AB-FZ-5

4.2.3.5.1 Fire Zone Boundary Construction Features

Building: AUXILIARY BUILDING Elev.: 281'

Fire Zone Name: General Area - Elevation 281'-0"

Length: 110 ft.

Width: 160 ft.

Height: 23 ft.

Area: 14,303 ft²

Drawings: 1-FHA-026, 025

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are Evaluated As Follows:

A three-hour rated fire barrier is provided on the south wall of this zone adjacent to fire zone AIT-FZ-1. The duct penetrating this barrier is fire sealed but the duct is not provided with a fire damper. Since the fire loading on either side of the barrier is low, the existing configuration is adequate. The north boundary is not adjacent to any

other plant area. The east boundary adjacent to the Fuel Handling Building (zone FH-FZ-1) is constructed of reinforced concrete (note passage from the Auxiliary Building to the Fuel Handling Building is through an opening in this boundary); however, an automatic wet pipe sprinkler system is provided in FH-FZ-1. The boundary adjacent to zone AB-FZ-3 is reinforced concrete. Open penetrations in the portion of the wall between AB-FZ-5 and AB-FZ-3 need not be sealed due to the B3 classification (see zone boundary evaluation for south wall of AB-FZ-3).

The boundary adjacent to zone AB-FZ-2 is reinforced concrete. Open penetrations need not be sealed due to the B3 classification (See zone boundary evaluation for south wall of AB-FZ-2.)

The boundary adjacent to zone AB-FZ-2c (south wall) is three-hour fire rated. Note that two duct penetrations in this boundary are not provided with fire dampers. Since the fire loadings between zones AB-FZ-2c and AB-FZ-5 are low and the outside of these penetrations are sealed and controlled, the existing configuration of this boundary is adequate. The east boundary of this zone adjacent to fire zones AB-FZ-2a, AB-FZ-2b and AB-FZ-2c is a B1 boundary constructed of reinforced concrete around each door section. The remainder of the boundary is solid concrete block. The doors are 1-1/2 hour fire rated, class B fire doors with a fusible link actuated damper protecting the ventilation grill. The portion of the east boundary adjacent to zone AB-FZ-4 does not consist of wall construction; however, this portion of the boundary is protected by a fire detection system and an automatic pre-action sprinkler system in AB-FZ-4. The west boundary of this zone consists of reinforced concrete, a portion of which is not adjacent to any other plant area and a portion of which is adjacent to zone AB-FZ-1. However, this boundary is not relied upon to protect redundant trains of safe shutdown equipment. (See discussion in AB-FZ-1). The floor of this zone is not adjacent to any other plant area except over fire area AB-FA-1 where the floor is a three hour rated fire barrier with the exception of two 1/4 inch thick steel equipment access hatches and Decay Heat/Building Spray Shield Plugs which are unrated over fire area AB-FA-1. The steel hatches are monitored daily to assure they are kept closed.

The DH-BS Vault Shield Plugs are installed using fire barrier installation procedure 1420-FB-1 to supply caulk sealant requirements between the plugs and the floor. This procedure defines the use of the same RTV caulk material that is used in rated fire seals. Due to the small openings between the joints, the normal 9" seal depth for a straight through unobstructed fire penetration is not possible. Therefore, the RTV caulk is used only to seal the gap between plugs and the floor while the concrete on concrete plug configuration provides the balance of the barrier.

These fire barrier seals are not credited as rated fire barrier seals as there is not a documented fire test formally documenting this equipment plug configuration. The robust concrete plug configuration consists of a staggered concrete vertical joint in the two-foot thick concrete equipment access plugs. The step change in the plugs occurs one foot from the top and bottom surfaces of the plugs. This step change not only provides a means to support the adjacent plugs but also prevents radiation streaming and prevents a clear path for fire or smoke from either side of the plugs.

The addition of RTV caulking to the opening around the plugs prevents any smoke passage to and from the vaults through any small gaps as well as provides a water barrier. In addition, the RTV prevents potential debris and unwanted material from being collected between concrete plugs and the floor as well as provides personnel safety by preventing a potential trip hazard. The construction design is adequate to contain a postulated fire.

The ceiling of this zone consists of reinforced concrete and is adjacent to fire zones AB-FZ-6, AB-FZ-6a, AB-FZ-7, AB-FZ-8 and AB-FZ-9. Zones AB-FZ-6 and 6a above are separated from each other by a one-hour fire barrier in order to separate EE-MCC-ESV-1A (AB-FZ-6) from EE-MCC-ESV-1B (AB-FZ-6a). The ceiling of fire zone AB-FZ-4 is adjacent to ES-MCC-1A. This zone boundary is protected by an automatically actuated pre-action system in AB-FZ-4. Any smoke or hot gases penetrating through the ceiling as a result of a fire in AB-FZ-5 will not migrate towards EE-MCC-ESV-1A as any penetrations in AB-FZ-5 where adjacent to fire zone AB-FZ-6 between the south wall of AB-FZ-6a and column line 7d as well as between column lines K and L (refer to Fire Area Layout 1-FHA-027) are sealed with non-combustible material having at least a one hour fire rating. Any smoke or hot gases originating in AB-FZ-5 where adjacent to AB-FZ-6 will not migrate to EE-MCC-ESV-1A due to a wall running east/west along column 7d between columns J and K (again refer to #1-FHA-027) which has a limited number of penetrations (note this is a radiation shield wall). The ceiling of this zone between column lines 9A and 11A, and J and K is a B1 classification where it interfaces with the zone AB-FZ-6 floor. This was accomplished by filling all open penetrations (except for four pipe penetrations that open into cubicles on the 306' level) with a non-combustible material having at least a one hour fire rating. The duct penetrating the ceiling is not provided with a fire damper. This portion of AB-FZ-5 contains electrical trays but the concentration is relatively light since most of this space contains tanks with aqueous contents. The combustible loading in AB-FZ-5 is low and due primarily to cable trays routed in other portions of the fire zone. Should a fire occur in AB-FZ-5, the heat dissipation over the large area of the zone and the lack of heavy concentration of combustibles in the vicinity of the duct would serve to render it impervious to heat deformation or failure for the expected duration of a fire. As the ventilation duct remains intact, it is considered an extension of the zone barrier between AB-FZ-5 and AB-FZ-6 in the space defined by column lines 9A to 11A/J to K and the classification of the barrier is undiminished. Should a fire occur in AB-FZ-6, the smoke and hot gases would tend to stratify upwards. In order to impact the duct below the floor slab of AB-FZ-6, heat generated by the fire would require migration downward through the duct louvers, counter to the constant flow of air in the duct, and generate sufficient heat to cause duct deformation and failure in AB-FZ-5. Such a scenario is not considered credible. The ceiling of this zone where it interfaces with the floor of zone AB-FZ-7 is a B1 classification with all open penetrations sealed with a non-combustible material, so that a fire in AB-FZ-5 could not cause damage to the Nuclear Service Closed Cycle pumps, Intermediate cooling pumps and Decay Heat Closed Cycle pumps. Circuit RE-384 for DH-LT-809 (BWST level) in this zone is provided with a 1-hour rated wrap because its redundant counterpart in AB-FZ-9 above was subject to damage by a fire in AB-FZ-5. Therefore, this boundary between AB-FZ-5 and AB-FZ-9 will still remain a B2 floor/ceiling slab. The remainder of the ceiling of AB-FZ-5 is not relied upon to

protect redundant safe shutdown components on either side.

Combustible loadings on either side of each non-fire rated boundary are identified in the analysis for each of the following fire zones:

AB-FZ-5, FH-FZ-1, AB-FZ-3, AB-FZ-2a, AB-FZ-2b, AB-FZ-2c,
AB-FZ-4, AB-FZ-6, AB-FZ-6a, AB-FZ-7, AB-FZ-8, AB-FZ-9 and AB-FZ-1

The principal combustible in this zone is cable insulation. Should ignition of cable occur either electrically or due to transient combustibles, the boundary features prevent fire from propagating through the zone boundary. The boundary adjacent to zones AB-FZ-1, 6a, 8, and 9 are not relied upon to protect redundant trains of safe shutdown equipment, are classified as B2 and are not sealed. Propagation is not a factor impacting safe shutdown.

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis criteria. The classification of each boundary in this zone is presented below:

| <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|-------------|-------------|--------------|----------------|
| <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| A1/B3* | Rated*** | A2/B1 | A1/B2** | A1/Rated*** | B1/B2**** |

* B3 where adjacent to AB-FZ-2 and AB-FZ-3, rated where adjacent to AB-FZ-2c with the exception of two duct penetrations, which lack fire dampers.

** B2 where adjacent to AB-FZ-1

*** Rated except for steel equipment access hatch and Concrete Shield Plugs in floor, two duct penetrations with no fire dampers in wall common to AB-FZ-2c, and duct penetration in wall common to AIT-FZ-1.

**** B2 where adjacent to AB-FZ-6a, AB-FZ-8 and 9. B1 and no damper in duct at column 9A to 11A and J to K.

Doors:

Entrance to this zone is through the east boundary through zone FH-FZ-1 and AB-FZ-4.

Barriers Within Zone:

One hour fire rated barriers are provided for circuits. See Attachment 3-1 for details.

Safe Shutdown Components:

For safe shutdown component located in this zone, see Attachment 3-6.

Safe Shutdown Repairs:

For safe shutdown repairs, see Attachment 3-7C.

4.2.3.5.2 Analysis

The combustibles in this zone consist of pump lube oil, cable insulation and transient material. The bulk of this material is contained in evaporators and steel tanks. The fire loading is low. Fire protection for this zone consists of a fire extinguisher and a hose station. Additional hose protection is provided in zone AB-FZ-4 and zone FH-FZ-1 as well as additional portable fire extinguishers located in zone FH-FZ-1 as shown on drawing 1-FHA-026. Smoke detection is provided in an area twenty (20) feet south and west from where fire barrier protection is to be provided and in the hallway that provides entrance to fire zone AB-FZ-1.

Exemptions:

Manual operation in lieu of cable and valve protection; no automatic suppression; partial detection; manual operation of valves in lieu of protection of instrument air supply. See Section 3.14 for details.

4.2.3.5.3 Conclusion

Due to the limited amount of combustible material in the zone, and the features described, existing fire protection for this zone is considered adequate.

4.2.3.6 Fire Zone AB-FZ-6

4.2.3.6.1 Fire Zone Boundary Construction Features

Building: AUXILIARY BUILDING Elev.: 305'

Fire Zone Name: Demineralizers and Motor Control Center A

Length: 124 ft.

Width: 30 ft.

Height: 21 ft.

Area 3,779 ft²

Drawings: 1-FHA-027

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hour

The Fire Zone Boundary Components Are Evaluated As Follows:

Zone boundaries consist of reinforced concrete walls, floor and ceiling. The south boundary and portion of the ceiling are not adjacent to any other plant areas. The remainder of the ceiling adjacent to the chemical addition area and ESF Ventilation Room is a three-hour fire barrier. Most of the north boundary is adjacent to fire zone AB-FZ-7 with an open passage between the zones. The open passage is provided with an automatic pre-action type water curtain actuated by a cross-zone type smoke detection system. All other openings are sealed with non-combustible material having at least a one hour fire rating. The remainder of the north boundary is adjacent to the Reactor Building, which is a three-hour rated fire barrier. The east boundary is adjacent to fire zones FH-FZ-1 and FH-FZ-2. The boundary between AB-FZ-6 and FH-FZ-1 is classified as an A2 boundary based on the suppression system in FH-FZ-1. The boundary between AB-FZ-6 and FH-FZ-2 is classified as a B2 category boundary because it is not relied on to separate redundant trains of equipment required for safe shutdown. The west boundary is adjacent to fire zone AB-FZ-9 with an open passage between the zones. However, this boundary is not relied upon to separate redundant trains of safe shutdown components from each other. The west boundary is also adjacent to fire zone AB-FZ-6a. A one hour fire rated barrier separates these fire zones. Note that the penetration of the Reactor Purge Exhaust duct through this barrier is not provided with a fire damper. This duct work is substantial construction (10 gauge stainless steel) adequate to withstand the effects of a fire. Penetrations around the periphery of this duct are sealed to a one hour fire rating and controlled as such. A three-hour rated fire barrier is provided on the floor where this zone is adjacent to fire zones AB-FZ-2a, AB-FZ-2b and AB-FZ-2c. The floor for this zone where it interfaces with the ceiling of zone AB-FZ-3 is a B1 classification with all but four open pipe penetrations sealed with non-combustible materials with at least a one hour fire rating. The four open pipe penetrations are described and the analysis regarding the lack of seals is included in the zone evaluation for AB-FZ-3.

The floor of this zone between column lines 9A and 11A, and J and K is a B1 classification where it interfaces with the zone AB-FZ-5 ceiling. All open penetrations (except for four pipe penetrations that open into cubicles on this level) are sealed with a non-combustible material having at least a one hour fire rating.

The duct penetrating into AB-FZ-5 is not provided with a fire damper. The details of this zone boundary and the analysis are described in the zone evaluation for AB-FZ-5.

An automatic pre-action system is located in AB-FZ-4 where the floor of this zone is adjacent to fire zone AB-FZ-4. The remainder of the floor is not relied upon to separate redundant trains of safe shutdown equipment from each other. Combustible loadings on either side of each non-fire rated zone boundary are identified in the analysis for each of the following fire zones:

AB-FZ-6, AB-FZ-7, AB-FZ-3, AB-FZ-4, AB-FZ-5, FH-FZ-2 and FH-FZ-1

The principal combustible in this zone is cable insulation. Should ignition of cable occur either electrically or due to transient combustibles, the boundary features prevent fire from propagating through the zone boundary. For those boundaries that are not relied on to separate redundant trains of safe shutdown equipment, propagation is not a factor impacting safe shutdown.

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis criteria. The classification of each boundary in this zone is presented below:

| <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|-------------|-------------|----------------|----------------|
| <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| B1/Rated | A1 | B2/A2** | B2/Rated* | Rated/A2/B1*** | A1/Rated |

* Rated for one hour fire resistance with the exception of a fire damper in Reactor Purge Exhaust duct penetration.

** Where adjacent to FH-FZ-1 automatic suppression is provided for FH-FZ-1 in elevation below.

*** Four unsealed pipe penetrations down to AB-FZ-3. No fire damper in duct to AB-FZ-5 and four unsealed pipe penetrations down to AB-FZ-5.

Doors:

Entrance to this zone is through the east boundary through zone FH-FZ-1, the west boundary through zone AB-FZ-6a, and through zone AB-FZ-9. Class B labeled doors are provided between AB-FZ-6 and AB-FZ-6a.

Barriers Within Zone:

None

Safe Shutdown Components:

For safe shutdown components contained within this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.2.3.6.2 Analysis

The combustibles in this zone consist of cable insulation and transient material. The fire loading is low. The fire protection for this zone consists of smoke detection in the motor control center areas which actuates alarms in the Control Room, cross zoned smoke detection which actuates an automatic pre-action sprinkler system to provide

a water curtain for the open passageway to AB-FZ-7 (alarms in Control Room upon actuation), a hose station located inside the motor control center area and portable fire extinguishers near the entrance to the Fuel Handling Building. Additional hose protection and a portable fire extinguisher is located in zone AB-FZ-9 as shown on drawing 1-FHA-027.

Exemptions:

Manual operation in lieu of cable and valve protection; no automatic fire suppression system; manual operation of valves in lieu of protection of instrument air supply. See Section 3.14 for details.

4.2.3.6.3 Conclusion

Due to the limited amount of combustible material in the zone, and the features described, existing fire protection for this zone is considered adequate.

4.2.3.6a Fire Zone AB-FZ-6a

4.2.3.6a.1 Fire Zone Boundary Construction Features

Building: AUXILIARY BUILDING Elev.: 305'

Fire Zone Name: Engineered Safeguards Motor Center B
Length: 20 ft. Width: 14 ft.
Height: 21 ft.
Area: 283 ft²

Drawings: 1-FHA-027

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are Evaluated As Follows:

Zone boundaries consist of reinforced concrete walls on the north and west walls. The east and south boundary adjacent to zone AB-FZ-6 are one hour fire barriers with rated class B fire doors. The penetration of the Reactor Purge Exhaust duct through the east barrier has no fire damper. This duct work is substantial construction (10 gauge stainless steel), adequate to withstand the effects of a fire.

Penetrations around the periphery of this duct are sealed to a one hour fire rating and controlled as such. The north wall is adjacent to zone AB-FZ-7. This boundary is a B1 wall with all open penetrations sealed with non-combustible material having at least a one hour fire rating. A rated fire damper is installed in the HVAC duct

penetration in this same zone boundary. The west wall is adjacent to fire zone AB-FZ-9 with an open passage to zone AB-FZ-9. The floor is constructed of reinforced concrete and is adjacent to fire zone AB-FZ-5. These boundaries are not relied on to separate redundant trains and are considered B2 classifications. The ceiling is constructed of reinforced concrete and is a three hour rated fire barrier. Combustible loadings on either side of each non-fire rated zone boundary are identified in the analysis for each of the following fire zones:

AB-FZ-6a, AB-FZ-7, AB-FZ-5, and AB-FZ-9

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis criteria. The classification of each boundary in this zone is presented below:

| <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|-------------|-------------|--------------|----------------|
| <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| B1 | **Rated | *Rated | B2 | B2 | Rated |

* Rated for one hour fire resistance with the exception of a fire damper in Reactor Purge Exhaust Duct penetration.

** Rated for one hour fire resistance

Doors:

Entrance to this zone is through the south and east boundary through Class B rated doors to zone AB-FZ-6 and through the west boundary through an unrated door to zone AB-FZ-9.

Barriers Within Zone:

None

Safe Shutdown Components:

For safe shutdown component contained within this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.2.3.6a.2 Analysis

The combustibles in this zone consist of cable insulation. The fire loading is low. The fire protection for this zone consists of smoke detection, which actuates alarms in the Control Room. A hose station is located in zone AB-FZ-6 near EE-MCC-ESV-1A. Portable fire extinguishers are located in zones AB-FZ-6 and AB-FZ-9 as shown

on drawing 1-FHA-027.

Exemptions:

Manual operation in lieu of cable protection; no automatic fire suppression system. See Section 3.14 for details.

4.2.3.6a.3 Conclusion

Due to the limited amount of combustible material in the zone, and the features described, existing fire protection for this zone is considered adequate.

4.2.3.7 Fire Zone AB-FZ-7

4.2.3.7.1 Fire Zone Boundary Construction Features

Building: AUXILIARY BUILDING Elev.: 305'

Fire Zone Name: Decay Heat Removal and Nuclear Service Closed
Cycle Cooling Pump Area

Length: 64 ft.

Width: 20 ft.

Height: 21 ft.

Area: 1,196 ft²

Drawings: 1-FHA-027

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are Evaluated As Follows:

Zone boundaries consist of reinforced concrete walls, floor and ceiling with an open passage in the south boundary between this zone and zone AB-FZ-6. The open passage is provided with an automatic pre-action type water curtain actuated by a cross-zone type smoke detection system. All other openings in this zone boundary wall between AB-FZ-7 and AB-FZ-6 are sealed with non-combustible material having at least a one hour fire rating.

The north boundary is not adjacent to any other plant area. The east boundary is adjacent to the Reactor Building, which is a three-hour rated fire barrier. Containment penetrations do not have a specific fire rating due to overriding nuclear considerations, however their construction is adequate to prevent the spread of fire to the Reactor Building. The west boundary is adjacent to zone AB-FZ-9. This wall is a B2 boundary. The south boundary is adjacent to zones AB-FZ-6, AB-FZ-6a, and AB-FZ-9. The entire south boundary is a B1 wall except where adjacent to AB-FZ-9. A rated fire damper is provided in the duct penetration in the zone boundary wall between zones AB-FZ-7 and AB-FZ-6a. The floor is adjacent to zones AB-FZ-4 and AB-FZ-5. An automatic pre-action system is located where the floor of this zone is adjacent to fire zone AB-FZ-4. The boundary adjacent to fire zone AB-FZ-5 is a B1 classification with all open penetrations sealed with a non-combustible material having at least a one hour fire rating (See discussion in AB-FZ-5). A portion of the ceiling is not adjacent to any other plant areas. The remainder of the ceiling, adjacent to the ESF Ventilation Room, is a three hour fire barrier. Combustible loadings on either side of each non-fire rated zone boundary are identified in the analysis for each of the following fire zones:

AB-FZ-7, AB-FZ-6, AB-FZ-6a, AB-FZ-9, AB-FZ-4, and AB-FZ-5

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis criteria. The classification of each boundary in this zone is presented below:

| <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|-------------|-------------|--------------|----------------|
| <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| A1 | B1/B2 | Rated | B2 | A2/B1 | A1/Rated |

Doors:

Entrance to this zone is through an opening in the south wall with no rating.

Barriers Within Zone:

One hour fire rated barriers are provided for circuits. See Attachment 3-1 for details.

Safe Shutdown Components:

For safe shutdown component contained within this zone, see Attachment 3-6.

Safe Shutdown Repairs:

For safe shutdown repairs, see Attachment 3-7C.

4.2.3.7.2 Analysis

The combustibles in this zone consist of pump lube oil contained in sumps, cable insulation and transient materials. The fire loading is low. Each pump is located in a reinforced concrete cubicle with front wall and ceiling openings to a common area. The safety related cables within this zone are located above the cubicles. Fire protection for this zone consists of smoke detection which actuates alarms in the control room, and cross zoned smoke detection which actuates an automatic pre-action sprinkler system to provide a water curtain for the open passageway to AB-FZ-6 (alarms in Control Room upon actuation). Hose protection is provided outside this fire zone in motor control center area of fire zone AB-FZ-6. Portable fire extinguishers are located in both fire zones AB-FZ-6 and AB-FZ-9 as shown on drawing 1-FHA-027.

Exemptions:

Barrier between equipment not rated; no automatic suppression system; manual operation of valves in lieu of protection of instrument air supply. See Section 3.14 for details.

4.2.3.7.3 Conclusion

Due to the limited amount of combustible material in this zone, and the features described, existing fire protection for this zone is considered adequate.

4.2.3.8 Fire Zone AB-FZ-8

4.2.3.8.1 Fire Zone Boundary Construction Features

Building: AUXILIARY BUILDING Elev.: 305'

Fire Zone Name: Waste Gas Decay Tanks Area
Length: 17 ft. Width: 42 ft.
Height: 21 ft.
Area: 623 ft²

Drawings: 1-FHA-027

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are As Follows:

Walls:

North - Reinforced Concrete-non fire rated (B2)
South - Reinforced Concrete-non fire rated (B2)
East - Reinforced Concrete-non fire rated (B2)
West - Reinforced Concrete-non fire rated (B2)

Ceiling:

Reinforced Concrete-3 hour rated

Floor:

Reinforced Concrete-non fire rated (B2)

Doors:

Entrance to this fire zone is through an opening in the east wall to fire zone AB-FZ-9 with no rating.

Penetrations:

Penetrations through any boundaries of this fire zone are not fire sealed except the ceiling.

Barriers Within Zone:

None

Safe Shutdown Components:

For safe shutdown component contained within this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.2.3.8.2 Analysis

The combustibles in this zone are limited to painted surfaces with no other combustible materials. The fire loading is low. Fire protection consists of hose protection and portable fire extinguishers available in zone AB-FZ-9.

Exemptions:

None

4.2.3.8.3 Conclusion

Due to the absence of safe shutdown equipment or components and no significant fire loading in the zone, the features described provide adequate fire protection for this zone.

4.2.3.9 Fire Zone AB-FZ-9

4.2.3.9.1 Fire Zone Boundary Construction Features

Building: AUXILIARY BUILDING Elev.: 305'

Fire Zone Name: Remainder of Elevation 305'

Length: 83 ft.

Width: 126 ft.

Height: 21 ft.

Area: 9,168 ft²

Drawings: 1-FHA-027

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are Evaluated As Follows:

Zone boundaries consist of reinforced concrete walls, floor and ceiling. Boundaries to AB-FZ-8, AB-FZ-6 and AB-FZ-6a are not relied upon to separate redundant trains of safe shutdown equipment from each other. A portion of the north boundary, and the entire south boundary are not adjacent to any other plant area. The remainder of the north boundary is adjacent to fire zone AB-FZ-7, which is a B2 wall. The west boundary is a three hour rated fire barrier. The floor is adjacent to zone AB-FZ-5. To protect one redundant BWST level transmitter needed for safe shutdown (either DH-LT-808 or DH-LT-809), circuit RE-384 for DH-LT-809 is wrapped in zone AB-FZ-5. Therefore, the rating of B2 for this floor/ceiling slab is valid (See discussion in AB-FZ-5). A portion of the ceiling adjacent to the chemical addition area and ESF Ventilation Room is a three-hour fire rated barrier; the remainder of the ceiling is not adjacent to any other plant area.

The principal combustible in this zone is activated charcoal, which is contained in the filtration units for the Reactor Building Purge Exhaust and Auxiliary and Fuel Handling Exhaust systems located in the fan equipment room portion of this zone. All penetrations to the fan equipment room are sealed with non-combustible material with the exception of the ducts, which are not provided with fire dampers. The units are provided with thermal detectors, which alarm in the control room and manually actuated deluge water spray systems. Cable insulation is minimal in this zone. Should ignition of cable occur either electrically or due to transient combustibles, the

boundary features prevent fire from propagating through the zone boundary. For those boundaries, which are not relied on to separate redundant trains of safe shutdown equipment, propagation is not a factor impacting safe shutdown.

Combustible loadings on either side of each non-fire rated zone boundary are identified in the analysis for each of the following fire zones:

AB-FZ-9, AB-FZ-8, AB-FZ-6a, AB-FZ-6, AB-FZ-7, and AB-FZ-5

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis criteria. The classification of each boundary in this zone is presented below:

| <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|-------------|-------------|--------------|----------------|
| <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| A1/B2 | A1 | B2 | Rated | B2 | A1/Rated |

Doors:

Entrance to this fire zone is through an opening in the east boundary adjacent to fire zone AB-FZ-6 and through an unlabeled door to the motor control center area of fire zone AB-FZ-6a and through an opening to zone AB-FZ-8.

Barriers Within Zone:

None

Safe Shutdown Components:

For safe shutdown component contained within this zone, see Attachment 3-6.

Radioactive material in this zone is contained within steel tanks and charcoal filter housings (1-FHA-027, 030, 031, 032).

Safe Shutdown Repairs:

None

4.2.3.9.2 Analysis

The combustibles in this zone consist of charcoal in the Auxiliary and Fuel Handling Building and Reactor Building Purge Exhaust Filtration Cabinets, cable insulation, a plastic tank, polyvinyl chloride (PVC) pipe and transient materials. The fire loading is low. The bulk of the combustible material consists of the filtration cabinet charcoal. Each cabinet is provided with thermal fire detectors, which alarm in the Control Room and a manually actuated deluge water spray system for fire protection of the

charcoal. Smoke detection is provided for the radwaste processing area with local alarm and alarm transmittal to the Control Room. Portable fire extinguishers are provided inside the fire zone as well as a hose station. Additional hose protection and portable fire extinguishers are provided in zone AB-FZ-6 as shown on drawing 1-FHA-027.

Exemptions:

Manual operation in lieu of cable protection, manual operation of valves in lieu of protection of instrument air supply. See Section 3.14 for details.

4.2.3.9.3 Conclusion

Due to the limited amount of combustible material (aside from the charcoal filters), the availability of deluge water spray systems and detection for the charcoal, and the features described, existing fire protection for this zone is considered adequate.

4.2.3.10 Fire Zone AB-FZ-10

4.2.3.10.1 Fire Zone Boundary Construction Features

Building: AUXILIARY BUILDING

Elev.: 331'

Fire Zone Name: Auxiliary Building

Floor Elevation: 331'

Length: 81 ft. Width: 104.7 ft.

(Chemical Addition Area)

Height: 22 ft.

Area (Approx.): 8,481 ft²

Drawing: 1-FHA-028

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: TBD hours (load assumed as high for analysis)

Design Rating: - hours

The Fire Zone Boundary Components Are as follows:

Walls:

North - Non fire rated*

South - Non fire rated*

East - Reinforced Concrete – 3-hour rated

West - Non fire rated*

Ceiling:

Non fire rated*

Floor:

Reinforced Concrete-partial 3-hour rated (under Chemical Addition area)

Doors:

Entrance to this fire zone is 3 hour rated door in the east boundary to FH-FZ-3.

*Not adjacent to other fire area or zone (A1 classification).

Penetration:

Penetrations through any boundaries of this fire zone are not fire sealed except floor and east wall.

Barriers Within Zone:

None

Safe Shutdown Components:

For the safe shutdown components in this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.2.3.10.2 Analysis

The combustibles in this zone consist of resins, hydrogen for RCS water treatment, cable insulation, waste oil collection and storage system, transient materials and other materials. The total fire loading is to be determined later, and is assumed as high for the purposes of conservative analysis. Smoke detection is provided, including the Snubber Test Stand Room, Instrument Equipment Room, Hot Machine Shop, and Hot Instrument Repair Shop, with local alarm and alarm transmittal to the Control Room. Portable extinguishers are provided inside the fire zone as well as a hose station. Additional hose protection is provided in zone FH-FZ-3 as shown on drawing 1-FHA-02B.

Exemptions:

Manual operation of valves in lieu of protection of instrument air supply. See Section 3.14 for details

4.2.3.10.3 Conclusion

Due to the availability of hose protection and portable extinguishers both inside and outside this fire zone, no safe shutdown equipment or components, and the features described, existing fire protection for this zone is considered adequate.

4.2.3.11 Fire Zone AB-FZ-11

4.2.3.11.1 Fire Zone Boundary Construction Features

Building: AUXILIARY BUILDING Elev.: 331'
Fire Zone Name: ESF Ventilation Room Floor Elevation: 331'
Length: 42 ft. Width: 29.3 ft.
Height: 16 ft.
Area (Approx.): 1,231 ft²

Drawings: 1-FHA-028, 031, 032

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are As Follows:

Walls:

North - Non-fire rated*

South - Non-fire rated*

East - Non-fire rated*

West - Non-fire rated*

Ceiling:

Non-fire rated*

Floor:

Reinforced Concrete-3 hour rated

*Not adjacent to other fire area or zone (A1 classification).

Doors:

Entrance to this zone is through unlabeled doors in non-fire rated exterior walls.

Penetrations:

Floor penetrations are sealed with 3-hour fire rated seals. Penetrations through other boundaries of this fire zone are not fire sealed.

Barriers Within Zone:

None

Safe Shutdown Components:

For the safe shutdown components in this zone, see Attachment 3-6 (none).

Safe Shutdown Repairs:

None

4.2.3.11.2 Analysis:

The combustibles in this zone consist of grease, plastic, oil and charcoal. The fire loading is low. Portable extinguishers are provided inside the fire zone and fire hose stations are available in AB-FZ-10 on the roof (elev 331') and on the elevation below. Thermistor line type fire detection is provided in the charcoal filter housings with alarms transmitted to the Control Room. Ductwork from this fire zone is located out-of-doors on the roof of the Auxiliary Building to FH-FZ-4 where 3-hour rated fire dampers are provided.

Exemptions:

None

4.2.3.11.3 Conclusion:

Due to the availability of portable extinguishers in the fire zone, fire hose stations within reasonable proximity to the zone, and fire detection with alarms to the Control Room for the only significant concentration of combustibles in the fire zone, fire protection is considered adequate. Since this fire zone contains no safe shutdown equipment, components, or cables and is separated from adjacent fire zones by three hour rated barriers, this fire zone presents no adverse impact on safe shutdown, nor does it present an exposure to plant areas containing equipment required for safe shutdown.

Intermediate Building**BUILDING FIRE AREA BOUNDARY CONSTRUCTION FEATURES**

Building: INTERMEDIATE BUILDING Elev.: 295' through 370'

Fire Area Name: INTERMEDIATE BUILDING

Length: 100 ft.

Width: 56 ft.

Height: 75 ft.

Area (Approx.): 4,500 ft.²

Drawing: 1-FHA-39, 40, 41, 42, 43

Fire Area Boundaries:

Fire Area Boundary Barrier Ratings:

Fire Loading: ____ hours

Design Rating: 3 hours

The Fire Area Boundary Components Are As Follows:

Walls:

North - Reinforced Concrete

South - Reinforced Concrete

East - Reinforced Concrete

West - Reinforced Concrete

Ceiling:

Reinforced Concrete

Floor:

Reinforced Concrete

Doors:

Access to this fire area is described under the construction features for each fire zone.

The intermediate building houses emergency feedwater, instrument air and main steam equipment.

4.3.1 Fire Zone IB-FZ-1

4.3.1.1 Fire Zone Boundary Construction Features

Building: INTERMEDIATE BUILDING Elev.: 295'

Fire Zone Name: VALVE GALLERY AND PENETRATION ROOM

Length: 40 ft.

Width: 12 ft.

Height: 27 ft.

Area: 494 ft²

Drawings: 1-FHA-039, 040

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are Evaluated As Follows:

Zone boundaries consist of reinforced concrete walls, floor and ceiling. The south boundary is a three-hour rated barrier. Containment penetrations do not have a specific fire rating due to overriding nuclear considerations, however their construction is adequate to prevent the spread of fire to the Reactor Building. A portion of the floor is adjacent to fire zone IB-FZ-8. The remainder of the floor is not adjacent to any other plant area. The boundaries between this zone and IB-FZ-2, IB-FZ-4, IB-FZ-5, and IB-FZ-6 above and IB-FZ-8 below are each classified as category B2 zone boundaries. Each boundary (wall or floor/ ceiling) is not relied upon to separate/protect redundant trains of safe shutdown equipment on either side of that zone boundary.

Combustible loadings on either side of each non-fire rated zone boundary are identified in the analysis for each of the following fire zones:

IB-FZ-2, IB-FZ-1, IB-FZ-4, IB-FZ-5, IB-FZ-6 and IB-FZ-8

The principal combustibles in this zone are epoxy floor paint and cable insulation. Should ignition of the floor paint or the cable occur either electrically or due to transient combustibles, the boundary features prevent fire from propagating through the zone boundary. For those boundaries, which are not relied on to separate redundant trains of safe shutdown equipment, propagation is not a factor impacting safe shutdown.

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis criteria. The classification of each boundary in this zone is presented below:

| <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|-------------|-------------|--------------|----------------|
| <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| B2 | Rated | B2 | B2 | B2/A1 | B2 |

Doors:

Entrance to this fire zone is through an unrated door on the east wall, through an opening in the north wall and through a Class A door in the north wall on elevation 305'-6", which is not maintained.

Barriers Within Zone:

None

Safe Shutdown Components:

For safe shutdown component contained within this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.3.1.2 Analysis

The combustibles in this zone are epoxy floor paint and cable insulation. The fire loading is low. Fire protection for this zone consists of ionization smoke detection, which actuates alarms in the Control Room. Hose protection is provided outside this fire zone in zone 1B-FZ-5. In addition, portable fire extinguishers are provided in zone 1B-FZ-5 as shown on drawings 1-FHA-039 and 1-FHA-040.

Exemptions:

Manual operation in lieu of cable protection; lack of an automatic suppression system, manual operation of valves in lieu of protection of instrument air supply. See Section 3.14 for details.

4.3.1.3 Conclusion

Due to the limited amount of combustible material in this zone, and the features described, existing fire protection for this zone is considered adequate.

4.3.2 Fire Zone IB-FZ-2

4.3.2.1 Fire Zone Boundary Construction Features

Building: INTERMEDIATE BUILDING Elev.: 295'
Fire Zone Name: TURBINE DRIVEN EMERGENCY FEEDWATER PUMP ROOM
Length: 37 ft. Width: 18 ft.
Height: 27 ft.
Area: 685 ft²

Drawings: 1-FHA-039 and 040

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are Evaluated As Follows:

Zone boundaries consist of reinforced concrete walls, floor and ceiling. The north boundary is adjacent to fire zone IB-FZ-4 on elevation 295' and adjacent to fire zone IB-FZ-5 on elevation 305'. The south boundary is a three-hour rated fire barrier. Containment penetrations do not have a specific fire rating due to overriding nuclear considerations, however their construction is adequate to prevent the spread of fire to the Reactor Building. The east boundary is adjacent to fire zone IB-FZ-3. The west boundary is adjacent to fire zone IB-FZ-1. A portion of the floor is adjacent to fire zone IB-FZ-8, and the remainder of the floor is not adjacent to any other plant area. The ceiling is adjacent to fire zone IB-FZ-6. The boundaries between this zone and IB-FZ-1, IB-FZ-4, IB-FZ-5 and IB-FZ-6 are each classified as category B2 zone boundaries. These boundaries (wall or floor/ceiling) are not relied upon to separate/protect redundant trains of safe shutdown equipment in the two respective zones on either side of that zone boundary. Combustible loadings on either side of each non-fire rated zone boundary are identified in the analysis for each of the following fire zones:

IB-FZ-2, IB-FZ-1, IB-FZ-3, IB-FZ-4, IB-FZ-5, IB-FZ-6 and IB-FZ-8

The principal combustibles in this zone are epoxy floor paint, cable insulation, and lube oil. Should ignition of cable occur either electrically or due to transient combustibles, the boundary features prevent fire from propagating through the zone boundary. For those boundaries, which are not relied on to separate redundant trains of safe shutdown equipment, propagation is not a factor impacting safe shutdown.

The openings in the wall between IB-FZ-2 and IB-FZ-3 are sealed with non-combustible material with at least a one hour fire rating and the HVAC duct in this same wall is provided with a fire damper. This damper is unlabelled because of

the redundant fusible link added by the manufacturer to ensure that the damper would not close prematurely due to a random failure of one fusible link; however, the damper is constructed to the same specifications as the manufacturer's labeled 3 hour damper. The hallway section of fire zone IB-FZ-4, which is adjacent to both fire zones IB-FZ-2 and IB-FZ-3 (with open doorways into both zones) is provided with ionization type smoke detectors to enhance the separation between these two fire zones. Openings in the boundary (floor) between IB-FZ-2 and IB-FZ-8 are sealed with non-combustible material with at least a one hour fire rating.

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis criteria. The classification of each boundary in this zone is presented below:

| <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|-------------|-------------|--------------|----------------|
| <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| B2 | Rated | B1 | B2 | B1/A1 | B2 |

Doors:

Entrance to this fire zone is through an unrated door on the west wall and through an opening in the north wall. A Class A sliding door on elevation 305'-6" is also provided, which is not maintained.

Barriers Within Zone:

None

Safe Shutdown Components:

For safe shutdown components contained within this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.3.2.2 Analysis

Combustibles in this zone are epoxy floor paint, pump and turbine lube oil, and cable insulation. The fire loading is low. Fire protection for this zone consists of ionization smoke detection, which actuates alarms in the Control Room, and ionization smoke detection in the hallway outside the north entry (see IB-FZ-4). Hose protection is provided outside this fire zone in zone IB-FZ-5. In addition, portable fire extinguishers are provided in zone IB-FZ-5 as shown on drawings 1-FHA-039 and 1-FHA-040.

Exemptions:

Manual operation of valves in zone in lieu of cable and valve protection; manual operation of valves in other zones in lieu of protecting back-up instrument air supply or instrument air supply. See Section 3.14 for details.

4.3.2.3 Conclusion

Due to the limited amount of combustibles in this zone, and the features described, existing fire protection for this zone is considered adequate.

4.3.3 Fire Zone IB-FZ-3

4.3.3.1 Fire Zone Boundary Construction Features

Building: INTERMEDIATE BUILDING Elev.: 295'

Fire Zone Name: MOTOR DRIVEN EMERGENCY FEEDWATER PUMP ROOM

Length: 40 ft.

Width: 53 ft.

Height: 27 ft.

Area: 2,328 ft²

Drawing: 1-FHA-039 and 40

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are Evaluated As Follows:

Zone boundaries consist of reinforced concrete walls, floor and ceiling. The north boundary is adjacent to fire zone IB-FZ-4 on elevation 295' and adjacent to fire zone IB-FZ-5 on elevation 305'. The south and east boundaries are three-hour rated fire barriers. Containment penetrations (south boundary) do not have a specific fire rating due to overriding nuclear considerations, however their construction is adequate to prevent the spread of fire to the Reactor Building. A small portion of the east boundary near the Reactor Building is not rated (below elevation 302'), where adjacent to IB-FZ-8. The west boundary is adjacent to fire zone IB-FZ-2. A portion of the floor is adjacent to fire zone IB-FZ-8, the remainder of the floor is not adjacent to any other plant area. The ceiling is adjacent to fire zone IB-FZ-6. The boundaries between this zone and IB-FZ-4, IB-FZ-5, IB-FZ-6 and IB-FZ-8 are each classified as category B2 zone boundaries. Each boundary (wall or floor/ceiling) is not relied upon to separate/protect redundant trains of safe shutdown equipment in the two respective zones on either side of that zone boundary. Combustible loadings on either side of each non-fire rated zone boundary are identified in the analysis for each of the following fire zones:

IB-FZ-3, IB-FZ-2, IB-FZ-4, IB-FZ-5, IB-FZ-6 and IB-FZ-8

The principal combustibles in this zone are epoxy floor paint and cable insulation. Should ignition of cable occur either electrically or due to transient combustibles, the boundary features prevent fire from propagating through the zone boundary. For those boundaries, which are not relied on to separate redundant trains of safe shutdown equipment, propagation is not a factor impacting safe shutdown.

The openings in the wall between IB-FZ-2 and IB-FZ-3 are sealed with non-combustible material with at least a one hour fire rating.

A fire damper is provided in the HVAC duct in this same boundary. This damper is unlabelled because of the redundant fusible link added by the manufacturer to ensure that the damper would not close prematurely due to a random failure of one fusible link; however, the damper is constructed to the same specifications as the manufacturer's labeled 3 hour damper. The hallway section of IB-FZ-4, which is adjacent to both fire zones IB-FZ-2 and IB-FZ-3 (with open doorways to both zones) is provided with Ionization type smoke detectors to enhance the separation between these two zones. The boundary between this zone and IB-FZ-8 is classified as a B2 boundary on the basis that an exemption has already been granted for manual operation of emergency feedwater valves in IB-FZ-3 after a fire in that zone would be extinguished, and the propagation of fire from IB-FZ-3 to IB-FZ-8 would only result in more damage to the same shutdown valve circuits already assumed lost in IB-FZ-3.

The above discussion provides the basis for establishing the boundary classifications in accordance with the zone boundary analysis criteria. The classification of each boundary in this zone is presented below:

| <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|-------------|-------------|--------------|----------------|
| <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| B2 | Rated | Rated/B2* | B1 | B2/A1 | B2 |

*B2 where adjacent to IB-FZ-8

Doors:

Entrance to this fire zone is through two openings in the north wall, an entrance also exists through the grating in the floor bordering the Reactor Building which opens to zone IB-FZ-8. Three Class A sliding doors are provided on elevation 305'-6" on the north wall, which are not maintained.

Barriers Within Zone: None

Safe Shutdown Components:

For safe shutdown components located within this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.3.3.2 Analysis

The combustibles in this zone consist of epoxy floor paint, pump and air compressor lube oil, minor quantities of hydrogen and cable insulation. The fire loading is low. Fire protection for this zone consists of ionization smoke detection, which actuates alarms in the Control Room, and ionization smoke detection in the hallway outside the north entry (see IB-FZ-4). Hose protection is provided outside this fire zone in zone IB-FZ-5. In addition, portable fire extinguishers are provided in zone IB-FZ-5 as shown on drawings 1-FHA-039 and 1-FHA-040.

Exemptions:

Manual alignment of valves in zone after a fire in the zone in lieu of cable protection; no automatic suppression systems; manual operation of valves in other areas in lieu of protection of instrument air supply or back-up instrument air supply. See Section 3.14 for details.

4.3.3.3 Conclusion

Due to the limited amount of combustible material in this zone, and the features described, existing fire protection for this zone is considered adequate.

4.3.4 Remainder of Elevation 295' IB-FZ-4

4.3.4.1 Fire Zone Boundary Construction Features

Building: INTERMEDIATE BUILDING Elev.: 295'
Fire Zone Name: REMAINDER OF ELEVATION 295'
Length: 30 ft. Width: 58 ft.
Height: 7 ft.
Area: 1,981 ft²

Drawing: 1-FHA-039 and 040

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are Evaluated As Follows:

Zone boundaries consist of reinforced concrete walls, floor and ceiling. The west boundary is not adjacent to any other plant area. The north boundary is adjacent to the Diesel Generator Building, which is a three-hour rated fire barrier. The remainder of the north boundary is not adjacent to any other plant areas. The east boundary adjacent to the Turbine Building and the south boundary adjacent to the Reactor Building are three-hour rated fire barriers. Containment penetrations (south boundary) do not have a specific fire rating due to overriding nuclear considerations, however their construction is adequate to prevent the spread of fire to the Reactor Building. The remaining east boundary is adjacent to fire zone IB-FZ-1. The remaining south boundary is adjacent to fire zones IB-FZ-1, IB-FZ-2, and IB-FZ-3 with open passages to each zone. A portion of the floor is adjacent to fire zone IB-FZ-8, and the remainder of the floor is not adjacent to any plant area. The ceiling is adjacent to fire zone IB-FZ-5. The boundaries between this zone and IB-FZ-1, IB-FZ-2, IB-FZ-3, IB-FZ-5, and IB-FZ-8 are each classified as category B2 zone boundaries. Each boundary (wall or floor/ceiling) is not relied upon to separate/protect redundant trains of safe shutdown equipment in the two respective zones on either side of that zone boundary. Fire zones IB-FZ-2 and IB-FZ-3 contain components that are redundant to each other. Both of these zones are adjacent to IB-FZ-4 and the boundary walls contain unsealed penetrations and other openings such as walkways. An ionization smoke detection system is provided in the hall way of IB-FZ-4 to enhance the separation between IB-FZ-2 and IB-FZ-3. Combustible loadings on either side of each non-fire rated zone boundary are identified in the analysis for each of the following fire zones:

IB-FZ-4, IB-FZ-1, IB-FZ-2, IB-FZ-3, IB-FZ-5 and IB-FZ-8

The principal combustibles in this zone are epoxy floor paint and cable insulation. Should ignition of cable occur either electrically or due to transient combustibles, the boundary features prevent fire from propagating through the zones boundary. For those boundaries, which are not relied on to separate redundant trains of safe shutdown equipment, propagation is not a factor impacting safe shutdown.

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis criteria. The classification of each boundary in this zone is presented below:

| <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|-------------|-------------|--------------|----------------|
| <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| Rated *A1 | *B2 | *B2 | A1 | B2/A1 | B2 |

* Portions adjacent to the Turbine, Diesel Generator and Reactor building are rated.

Doors:

Entrance to this fire zone is through openings in the south wall to fire zones IB-FZ-1 and IB-FZ-3. Stairwells in these zones lead to fire zone IB-FZ-5, which has access to the Turbine Building. An entrance also exists through grating in the floor bordering the Reactor Building, which opens to zone IB-FZ-8.

Barriers Within Zone:

None

Safe Shutdown Components:

For safe shutdown components located within this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.3.4.2 Analysis

The combustibles in this zone are comprised of epoxy floor paint and cable insulation. The fire loading is low. Hose protection and portable fire extinguishers may be introduced to this fire zone from zone IB-FZ-5 via zones IB-FZ-1 and IB-FZ-3 as shown on drawings 1-FHA-039 and 1-FHA-040. Ionization smoke detectors are provided in the hallway section of this zone, which is adjacent to fire zones IB-FZ-2 and IB-FZ-3.

Exemptions:

Manual operation in lieu of cable protection; manual operation of valves in lieu of protection of instrument air supply. See Section 3.14 for details.

4.3.4.3 Conclusion

Due to the limited amount of combustible material, and the features described, existing fire protection for this zone is considered adequate.

4.3.5 Fire Zone IB-FZ-5

4.3.5.1 Fire Zone Boundary Construction Features

Building: INTERMEDIATE BUILDING Elev.: 305'

Fire Zone Name: INTERMEDIATE BUILDING AT ELEVATION 305'-Corridor

Length: 30 ft.

Width: 58 ft.

Height: 17 ft.

Area: 1,981 ft²

Drawing: 1-FHA-040

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are Evaluated As Follows:

Zone boundaries consist of reinforced concrete walls, floor and ceiling. The north boundary adjacent to the Diesel Generator Building and Service Building is a three-hour fire rated barrier. The east boundary adjacent to the Turbine Building and the south boundary adjacent to the Reactor Building are three-hour rated barriers. Containment penetrations (south boundary) do not have a specific fire rating due to overriding nuclear considerations, however their construction is adequate to prevent the spread of fire to the Reactor Building. The remaining east boundary is adjacent to fire zone IB-FZ-1. The remaining south boundary is adjacent to fire zones IB-FZ-1, IB-FZ-2, and IB-FZ-3. The west boundary is not adjacent to any other plant areas. The floor is adjacent to fire zone IB-FZ-4. The ceiling is adjacent to fire zone IB-FZ-6. The boundaries between this zone and IB-FZ-1, IB-FZ-2, IB-FZ-3, IB-FZ-4 and IB-FZ-6 are each classified as category B2 zone boundaries. Each boundary (wall or floor/ ceiling) is not relied upon to separate/protect redundant trains of safe shutdown equipment in the two respective zones on either side of that zone boundary. Combustible loadings on either side of each non-fire rated zone boundary are identified in the analysis for each of the following fire zones:

IB-FZ-5, IB-FZ-1, IB-FZ-2, IB-FZ-3, IB-FZ-4 and IB-FZ-6

The boundaries of this fire zone are of concrete construction, which provides a substantial barrier to fire propagation. The boundary features prevent fire from propagating through the zone boundary. For those boundaries, which are not relied on to separate redundant trains of safe shutdown equipment, propagation is not a factor impacting safe shutdown.

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis criteria. The classification of each boundary in this zone is presented below:

| <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|-------------|-------------|--------------|----------------|
| <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| Rated | B2/Rated | Rated/B2 | A1 | B2 | B2 |

Doors:

Entrance to this fire zone is a Class A rated door on the east wall, which is adjacent to the Turbine Building. Entrance via the stairwell to zone IB-FZ-6 is unrated. Entrance from zones IB-FZ-1, 2 & 3 is through Class A doors, which are not maintained.

Barriers Within Zone:

None

Safe Shutdown Components:

For safe shutdown components located within this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.3.5.2

Analysis

The combustibles in this zone are primarily comprised of cable insulation and transient materials. The fire loading is low. Fire protection for this zone consists of portable fire extinguishers and fire hose stations as shown on drawing 1-FHA-040. Ionization smoke detection is provided in this zone as shown on drawing 1-FHA-040.

Exemptions:

Manual operation of valves in lieu of protection of instrument air supply (see Section 3.14 for details).

4.3.5.3

Conclusion

Due to the limited amount of combustible material, and the features described, existing fire protection for this zone is considered adequate.

4.3.6 Fire Zone IB-FZ-6

4.3.6.1 Fire Zone Boundary Construction Features

Building: INTERMEDIATE BUILDING Elev.: 322'

Fire Zone Name: INTERMEDIATE BUILDING AT ELEVATION 322'

Length: 140 ft.

Width: 48 ft.

Height: 33 ft.

Area: 5,488 ft²

Drawing: 1-FHA-041

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are Evaluated As Follows:

Zone boundaries consist of reinforced concrete walls, floor and ceiling. The north, south, and east boundaries are three-hour rated fire barriers. Containment penetrations (south boundary) do not have a specific fire rating due to overriding nuclear considerations, however their construction is adequate to prevent the spread of fire to the Reactor Building.

The west boundary is not adjacent to any other plant area. There are unprotected openings in the west boundary, which communicate to the yard. This boundary is treated as fire rated for insurance purposes. Based on separation distance from the yard to post-fire safe shutdown equipment within the fire zone, there is no impact on post-fire safe shutdown capacity.

The floor is adjacent to fire zones IB-FZ-1, IB-FZ-2, IB-FZ-3, and IB-FZ-5. The ceiling is adjacent to fire zone IB-FZ-7. The boundaries between this zone and IB-FZ-1, IB-FZ-2, IB-FZ-3, IB-FZ-5, and IB-FZ-7 are each classified as category B2 zone boundaries. Each boundary (wall or floor/ceiling) is not relied upon to separate/protect redundant trains of safe shutdown equipment in the two respective zones on either side of that zone boundary. Combustible loadings on either side of each non-fire rated zone boundary are identified in the analysis for each of the following fire zones:

IB-FZ-6, IB-FZ-1, IB-FZ-2, IB-FZ-3, IB-FZ-5 and IB-FZ-7

The boundaries of this fire zone are of concrete construction, which provides a substantial barrier to fire propagation. The boundary features prevent fire from propagating through the zone boundary. For those boundaries, which are not relied on to separate redundant trains of safe shutdown equipments, propagation

is not a factor impacting safe shutdown.

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis criteria. The classification of each boundary in this zone is presented below:

| <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|-------------|-------------|--------------|----------------|
| <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| Rated | Rated | Rated | A1 | B2 | B2 |

Doors:

Entrance to this fire zone is through open stairwells to fire zones IB-FZ-5 and IB-FZ-7 and through a ladder to fire zone IB-FZ-3.

Barriers Within Zone:

None

Safe Shutdown Components:

For safe shutdown components located within this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.3.6.2 Analysis

Combustibles in this zone consist of cable insulation, minor quantities of hydrogen and transient materials. The fire loading is low. Fire protection for this zone consists of a fire hose station and a fire extinguisher as shown on drawing 1-FHA-041.

Exemptions:

Manual operation in lieu of cable protection, manual operation of valves in lieu of protection of instrument air supply. See Section 3.14 for details.

4.3.6.3 Conclusion

Due to the limited amount of combustible material, and the features described, existing fire protection is considered adequate for this zone.

4.3.7 Fire Zone IB-FZ-7

4.3.7.1 Fire Zone Boundary Construction Features

Building: INTERMEDIATE BUILDING Elev.: 355'

Fire Zone Name: INTERMEDIATE BUILDING AT ELEVATION 355'

Length: 85 ft.

Width: 48 ft.

Height: 15 ft.

Area: 3,721 ft²

Drawing: 1-FHA-042

Fire Zone Boundaries:

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are Evaluated As Follows:

Zone boundaries consist of reinforced concrete walls, floor and ceiling. The south and east boundaries are three-hour rated fire barriers. Containment penetrations (south boundary) do not have a specific fire rating due to overriding nuclear considerations, however their construction is adequate to preventing the spread of fire to the Reactor Building. The north and west boundaries and the ceiling are not adjacent to any other plant area. The floor is adjacent to fire zone IB-FZ-6. The boundary between this zone and IB-FZ-6 is classified as a category B2 zone boundary. This boundary is not relied upon to separate/protect redundant trains of safe shutdown equipment in the two zones on either side of that zone boundary. Combustible loadings on either side of each non-fire rated zone boundary are identified in the analysis for each of the following fire zones:

IB-FZ-7, IB-FZ-6

The boundaries of this fire zone are of concrete construction, which provides a substantial barrier to fire propagation. The boundary features prevent fire from propagating through the zone boundaries. For those boundaries, which are not relied on to separate redundant trains of safe shutdown equipments, propagation is not a factor impacting safe shutdown.

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis criteria. The classification of each boundary in this zone is presented below:

| <u>Walls</u> | | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|-------------|-------------|--------------|----------------|
| <u>North</u> | <u>South</u> | <u>East</u> | <u>West</u> | | |
| A1 | Rated | Rated | A1 | B2 | A1 |

Doors:

Entrance to this fire zone is through an open stairwell to fire zone IB-FZ-6.

Barriers Within Zone:

None

Safe Shutdown Components:

For safe shutdown components located within this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.3.7.2 Analysis

The only combustible in this zone is comprised of cable insulation. The fire loading is low. Fire protection for this zone consists of a fire hose station as shown on drawing 1-FHA-042.

Exemptions:

Manual operation in lieu of cable protection. See Section 3.14 for details.

4.3.7.3 Conclusion

Due to the limited amount of combustible material, and the features described, existing fire protection for this zone is considered adequate.

4.3.8 Fire Zone IB-FZ-8

4.3.8.1 Fire Zone Boundary Construction Features

| | |
|--|-----------------------|
| <u>Building:</u> INTERMEDIATE BUILDING | <u>Elev.:</u> 279'-0" |
| Fire Zone Name: Alligator Pit | |
| Length: Δ | Width: 5' |
| Height: 45' | |
| Area: 1,661 ft ² | |
| Δ Circular Arrangement | |

Drawing: 1-FHA-017

Fire Zone Boundaries

Fire Zone Boundary Barrier Ratings:

Fire Loading: <1 hours

Design Rating: - hours

The Fire Zone Boundary Components Are Evaluated As Follows:

Zone boundaries consist of reinforced concrete walls, floor and ceiling. Walls adjacent to the Reactor Building, Fuel Handling Building, Auxiliary Building and ceiling adjacent to the Turbine Building are three-hour rated fire barriers. The boundaries between this zone and the fuel handling building (FH-FZ-1) and the Auxiliary Building (AB-FZ-4) contain steel panel flood doors (bolted shut) which are not labeled fire doors. The floor and a portion of the ceiling is not adjacent to any other plant area. The remainder of the ceiling is adjacent to fire zones IB-FZ-1, IB-FZ-2, IB-FZ-3 and IB-FZ-4.

Combustible loadings on either side of each non-fire rated zone boundary are identified in the analysis for each of the following fire zones:

IB-FZ-1, IB-FZ-2, IB-FZ-3, IB-FZ-4 and IB-FZ-8

The combustibles in this zone consist of cable insulation. Note that significant quantities of grease contained within stressing cover plates associated with the reactor building tendons are located in this zone. However, this is not considered to add significantly to the fire loading because the grease is contained and therefore is not included in the calculated fire loading.

Openings in the ceiling adjacent to fire zone IB-FZ-2 are sealed with non-combustible material having at least a one hour fire rating. The boundary between this zone and IB-FZ-1, IB-FZ-3 and IB-FZ-4 is classified as B2 based on manual operation of emergency feedwater valves in IB-FZ-3 if valve circuits are damaged by fire in IB-FZ-8. A small portion of the common all between IB-FZ-3 and IB-FZ-8 near the Reactor Building (below elevation 302') is also classified B2. The boundary features prevent fire from propagating through the zone boundaries. For those boundaries, which are not relied on to separate redundant trains of safe shutdown equipment, propagation is not a factor impacting safe shutdown.

The above discussion provides the basis for establishing the boundary classification in accordance with the zone boundary analysis. The classification of each boundary in this zone is presented below:

| <u>Walls</u> | | | <u>Floor</u> | <u>Ceiling</u> |
|--------------|--------------|--------------|--------------|----------------|
| <u>Outer</u> | <u>South</u> | <u>Inner</u> | | |
| A1 | Rated | Rated | A1 | B1/B2/Rated |

Doors:

Entrance to this fire zone through steel panel unlabeled flood doors at the entrance to the Fuel Handling Building (Zone FH-FZ-1) and Auxiliary Building (Zone AB-FZ-4). Entrance via the ladder through the steel grating to zone IB-FZ-3 unrated.

Barriers Within Zone:

None

Safe Shutdown Components:

For safe shutdown components located within this zone, see Attachment 3-6.

Safe Shutdown Repairs:

None

4.3.8.2 Analysis

Combustibles in this zone are primarily comprised of cable insulation. The fire loading is low. Portable fire extinguishers are provided outside this zone from the Intermediate Building IB-FZ-5.

Exemptions:

Manual operation in lieu of cable protection; steel plate doors in fire rated barriers to AB-FZ-4 and FH-FZ-1; manual operation of valves in lieu of protection of instrument air supply. See Section 3.14 for details.

4.3.8.3 Conclusion

Due to the low fire loading in this zone, and the features described, existing fire protection for this zone is considered adequate.